

ANC



# POPULAR MECHANICS

## MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

HOW TO TRADE MARKS, GREAT DRIVEN ME, ACADEMY



SEE "THE NEW CROP OF LIGHT CARS" PAGE 96



NEW

NEW

NEW

# AUTO-LITE

## *Resistor*

# SPARK PLUG

### *Here's what it is*

The many benefits which can be obtained through a wider than standard spark gap setting are well known to the automotive industry. Up to this time the rate of spark gap increase due to electrode erosion has been such that the desired wide setting has not been generally used. Auto-Lite, working with leading car and truck manufacturers, has Ignition Engineered a built-in 10,000 Ohm Resistor which reduces electrode erosion so that Auto-Lite Spark Plugs can now be given this wider gap setting desirable for improved operation and economy.

### *Here's what it does*

**PROMOTES SMOOTHER IDLING**, because the wider spark gaps help eliminate occasional missing.

**REDUCES MISFIRING** due to lean spots in carburetion.

**ASSISTS IN BURNING OF LEANER MIXTURES** for improved engine economy at idle and throughout the speed range.

**REDUCES RING AND CYLINDER WEAR** when lubrication is washed away by gasoline not burned as a result of occasional misses.

**INCREASES ELECTRODE LIFE** up to 200% and more.

**SUPPRESSES SPARK PLUG INTERFERENCE** with radio, radio-telephone, radar and television reception.\*

### **Advantages So Significant They Are Expected To Affect The Entire Industry**

A complete line of Auto-Lite Resistor Spark Plugs with the built-in Resistor will soon be available for original equipment and replacement on popular makes of cars, trucks and tractors. The regular line of ignition engineered Auto-Lite Spark Plugs, which has won such an enviable reputation for dependability of performance, will continue to be manufactured. Ask your favorite dealer.

**THE ELECTRIC AUTO-LITE COMPANY**  
Toronto 1, Ontario      Toledo 1, Ohio

NEW

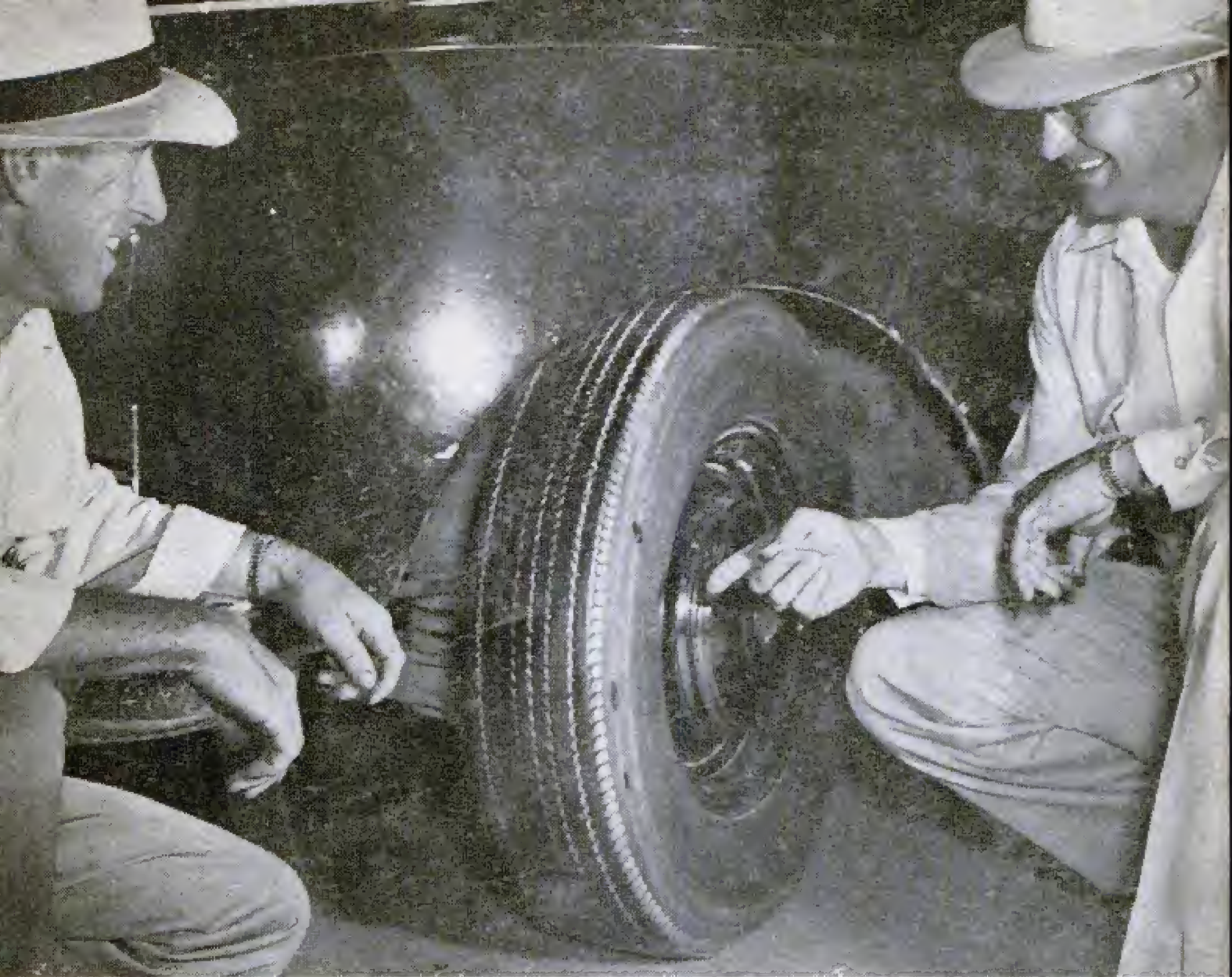
## BUILT-IN RESISTOR

Auto-Lite Ignition Engineers, working with leading automotive manufacturers, have developed the new Auto-Lite Resistor Spark Plug with this built-in resistor. As a result, improved operation and economy will be possible for the owners of cars, trucks and tractors everywhere.



\*Within 35 mv/m from 540 kc. to 150 mc. at 50 ft.





## Typical example: user's experience with B. F. Goodrich tires

**T**HE smiling man on the right in the picture above is Curtis Corn of Roswell, New Mexico. He and a partner own the 201 Taxi Company and operate a fleet of 16 cabs over a 100-mile radius in New Mexico.

Mr. Corn says his B. F. Goodrich Silvertowns outwear any other tires he has ever owned—including prewar tires. Mr. Corn had a good chance to compare brands during the tire shortage when he used whatever tires he could get. B. F. Goodrich tires outperformed them all.

Here are two examples of B. F. Goodrich tire service from fleet records:

One pair of Silvertowns gave 49,896 miles of continuous, trouble-free service before being removed. And Mr. Corn adds that these casings still looked good for 2,000 *more* miles.

Another pair of B. F. Goodrich tires traveled 42,000 miles on one of the cabs before it was removed and durecapped. These tires are back in service now.

Mr. Corn's experience is typical. Hundreds of other enthusiastic B. F. Goodrich owners report outstanding mileages too. B. F. Goodrich tires go farther because tread wear is more uniform. This tread puts a bigger footprint on the road

and makes every inch of rubber take its fair share of the load. The tire body has more and stronger cords in it—and a double breaker strip for protection against shocks.

If you need tires, see your B. F. Goodrich dealer today. You'll be surprised what your old tires are worth on a trade-in. If you don't know the address, look under *Tires* in the yellow pages of your 'phone book. *The B. F. Goodrich Company, Akron, Ohio.*

**B.F. Goodrich**  
FIRST IN RUBBER



Dependable

# CHAMPION

America's Favorite Spark Plug



Utilities having a direct obligation to the public are exacting buyers of such vital equipment as spark plugs. Their fleets must have dependable ignition. Ex-

perts on spark plug performance and dependability, the majority specify dependable Champion Spark Plugs. Champion Spark Plug Company, Toledo 1, Ohio.

***FOLLOW THE EXPERTS—DEMAND NEW DEPENDABLE CHAMPIONS FOR YOUR CAR***

*Listen to the CHAMPION ROLL CALL . . . Harry Wismer's fast sportscast every Friday night, over the ABC network*



# Popular Mechanics Magazine

Registered in U. S. Patent Office and Canada

H. H. WINDSOR, Founder

H. H. WINDSOR, Jr., Editor and Publisher



THIS hotel to be built of diamond-shaped colored glass panes was designed by Frank Lloyd Wright. It has overlapping stories which are self-cleaning. The shape of the novel structure of 47 stories may startle tourists in Dallas, Tex., when it is erected. The work of

Wright, America's most original and best known architect, is the subject of Cliff Hicks' feature on page 164. Hicks visited Wright at his Taliesin school near Spring Green, Wis., to learn about "Architecture From the Ground Up."

NEXT MONTH a feature on speedboats (they broke 14 world records last year in two days) contains the amazing prediction of a 10-percent increase in speed for the 1948 races. Another May feature delves into what is going on in farm building these days. Ever hear of steel barns and of "milk-ing parlors?" They partially explain why "The Old Red Barn Is Vanishing."

CRAFTSMAN features for May include constructional details for a modern flat-topped desk in "island base" design. One top drawer pulls out to form a base for a portable typewriter. Photo fans will find full instructions for building a 35-mm. slide projector with an unusual ventilating system. Shop Notes tells how to check the family auto before starting on that vacation trip.

ANY audio amplifier may be used with the four-tube super tuner described in the May Radio and Electronics section.

Volume 89

APRIL 1948

Number 4

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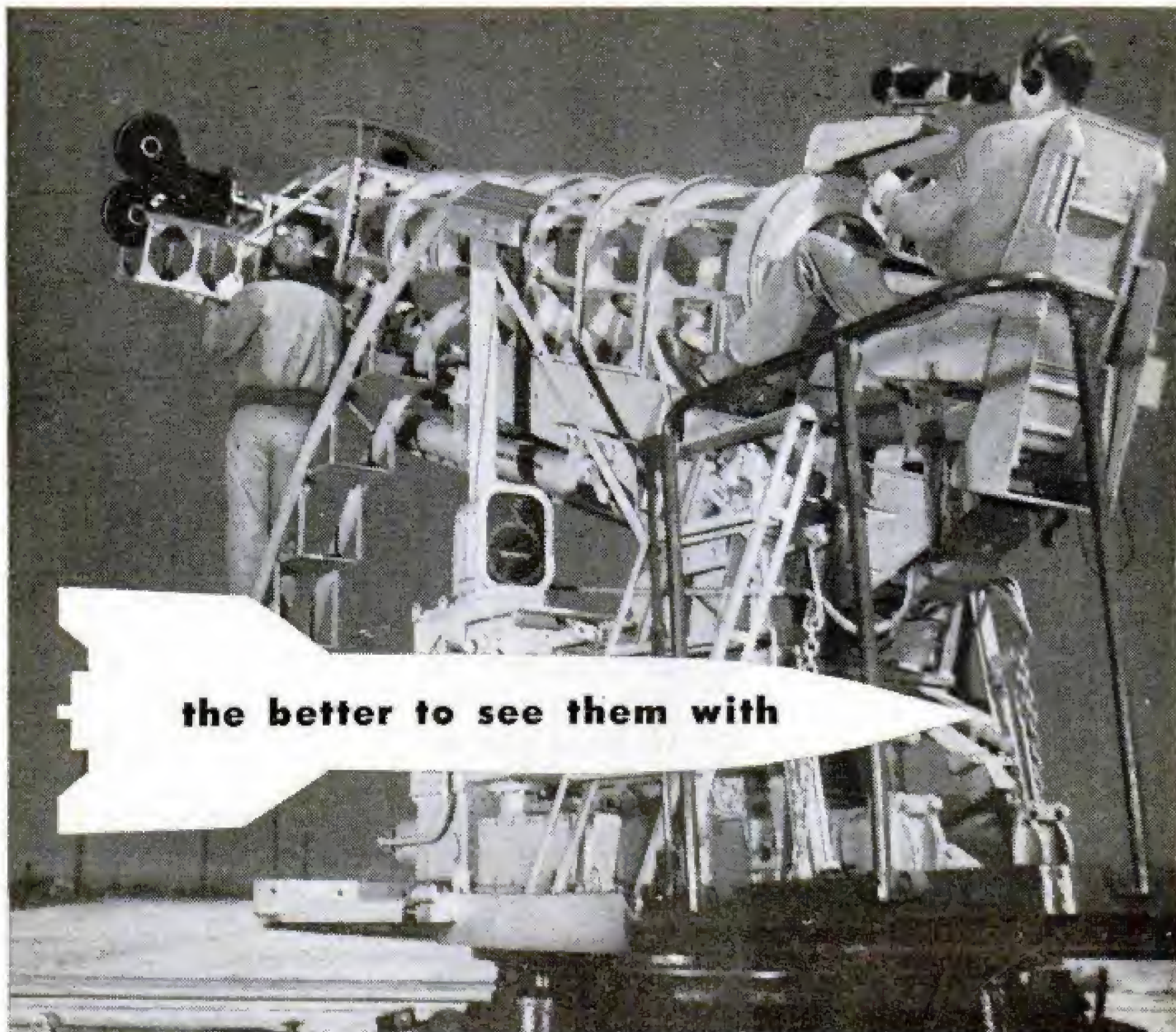
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**the better to see them with**

This colossal 16-inch reflecting telescope was designed and built by the U. S. Army's Ordnance Department. Artillerymen and airmen will use it to study the flight of guided missiles whizzing along at 3000 miles an hour at altitudes of 100 miles or more.

The telescope, fixed to an antiaircraft gun mount, tracks three and four degrees per second in azimuth and elevation, respectively. A 35-mm. camera attachment records the image produced by the telescope, takes 15 exposures every second. Experts are thus able to check missile controls, collect aerodynamic information, and follow ejection of instruments attached to the missiles.

The reflecting telescope is another spectacular example of what the U. S.

Army is accomplishing in the fascinating realm of research and development. Thousands of projects, covering virtually every scientific field, are going forward daily at Army laboratories and proving grounds. If you want to be a member of an organization that is leading the way to great new things for the future, consider the U. S. Army. There are many new programs available specifically to young men interested in science. Your nearest U. S. Army and U. S. Air Force Recruiting Station will be glad to give you full details.

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IS ARMY DAY**

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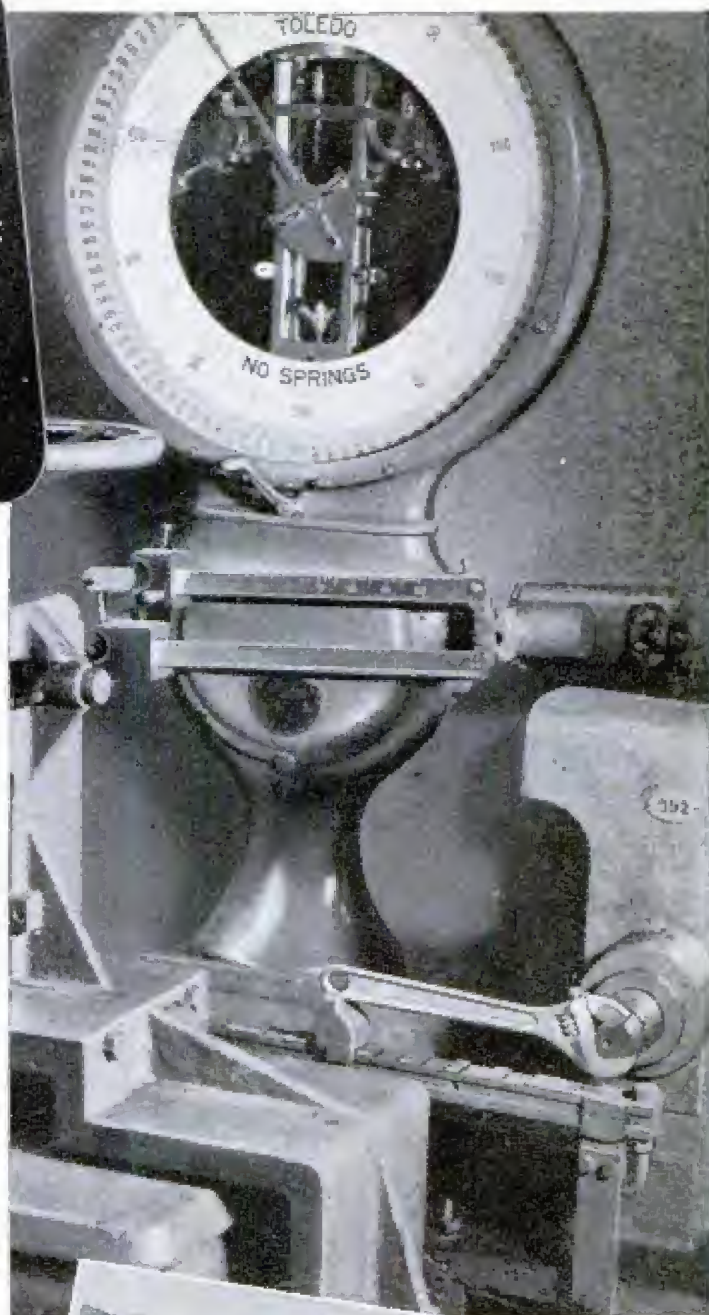


# Tests Prove STRENGTH and DURABILITY of **CRESCENT\*** TOOLS

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CRESCENT TOOL COMPANY, Jamestown, N. Y.

\*"CRESCENT" is our trade-mark registered in the United States and foreign countries for wrenches and other tools. "Crescent" tools are made only by Crescent Tool Company of Jamestown, N. Y., and are sold by leading distributors everywhere.





# INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the U. S. Patent Office. For that reason, the Patent Office advises the inventor, unless he is familiar with such matters, to engage a competent registered patent attorney or agent to represent him. We maintain a staff of registered patent attorneys ready to serve you in the handling of your patent matters.

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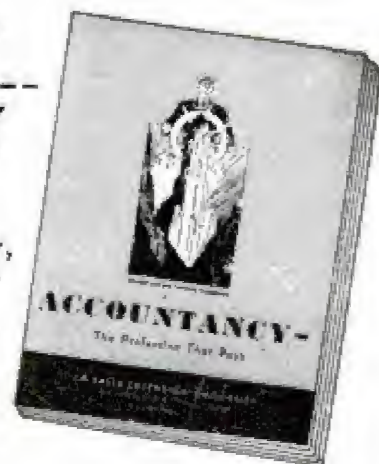
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**ROCKEFELLER CENTER**—city within a city, mecca of visitors, radio headquarters.

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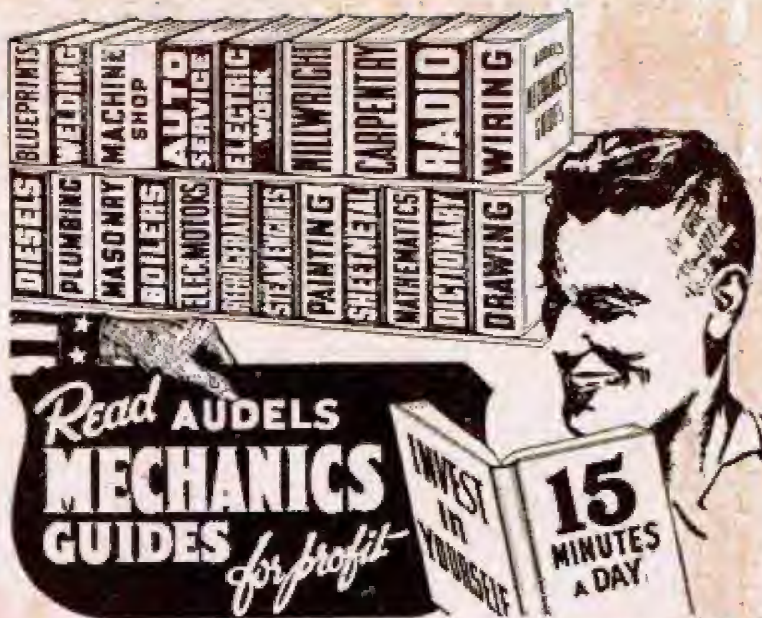
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2  
4  
6  
8

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1  
3  
5  
7  
9

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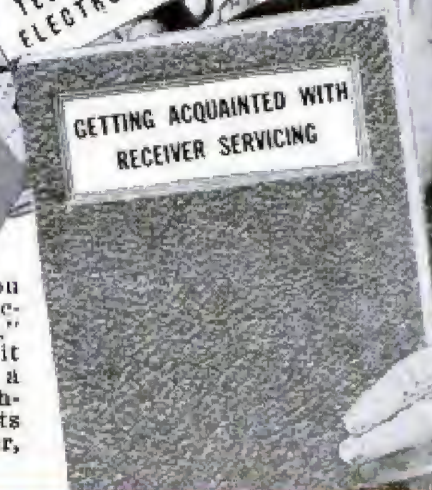
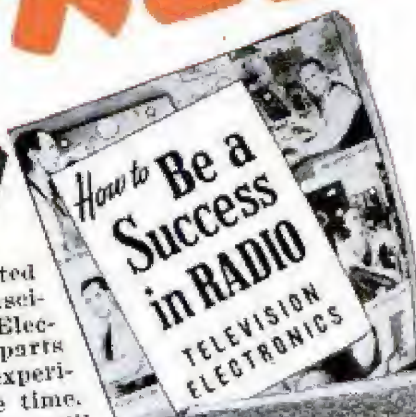
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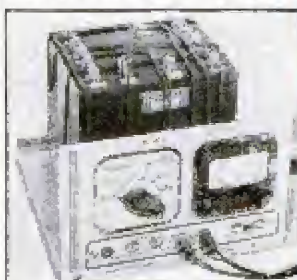
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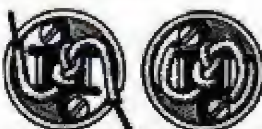
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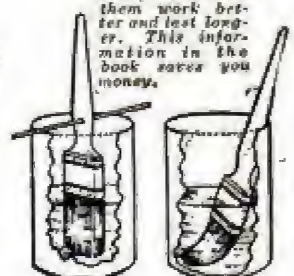
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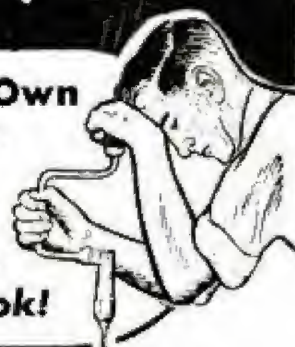
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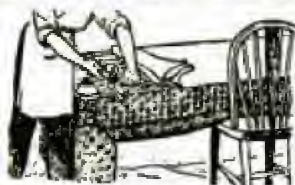
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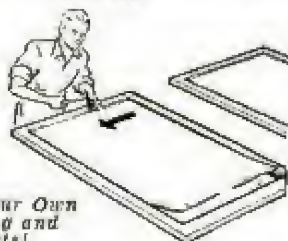
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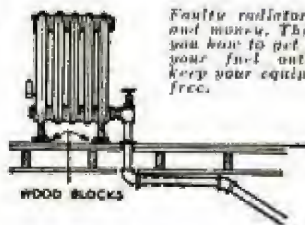
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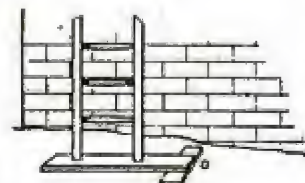
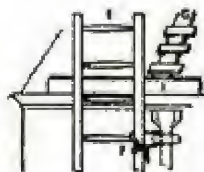
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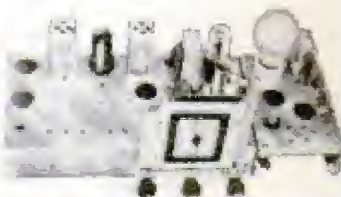


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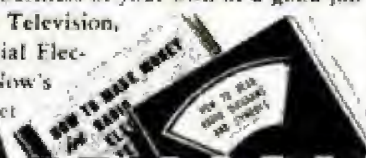


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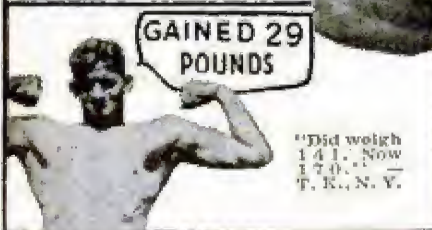
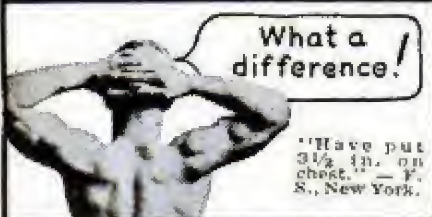
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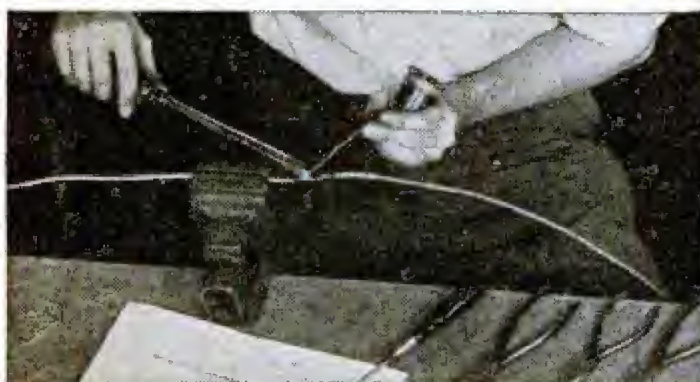
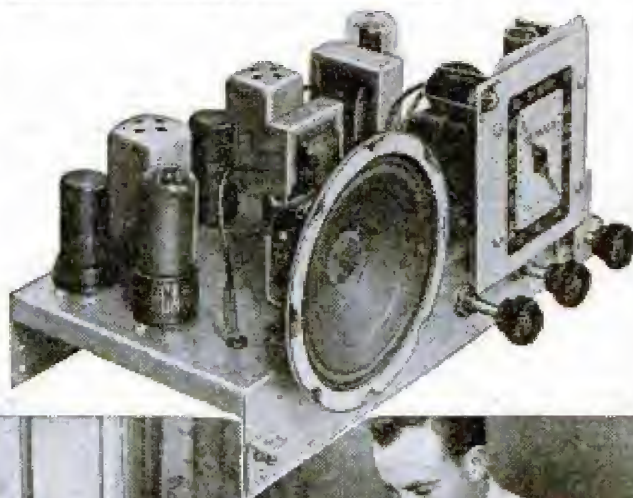
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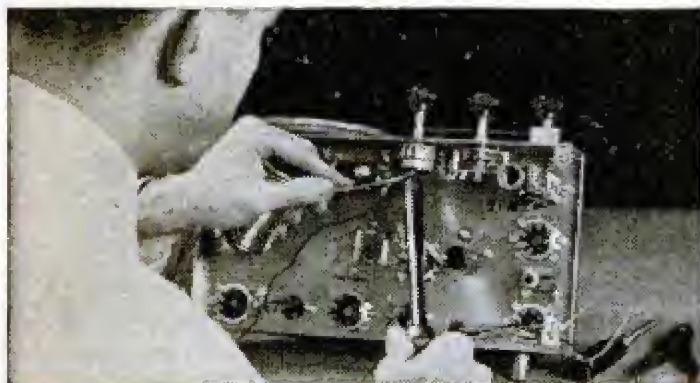
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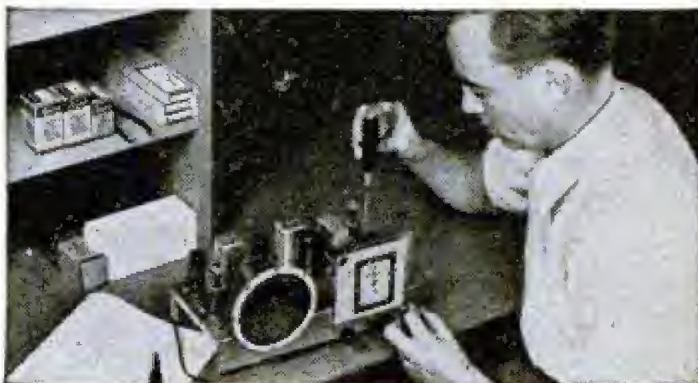
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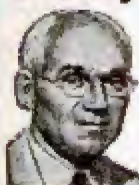
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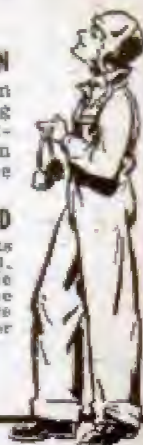
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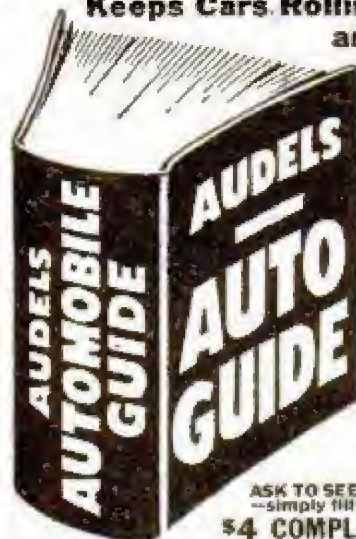






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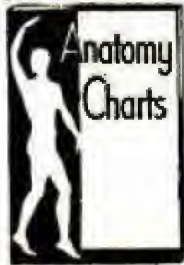
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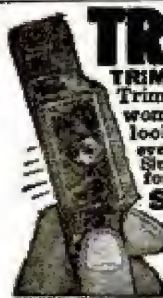
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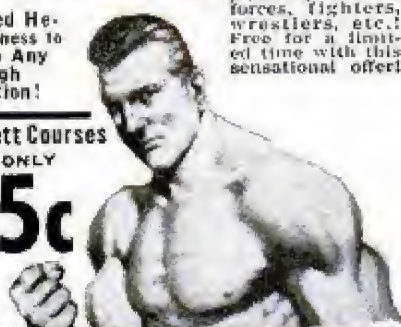
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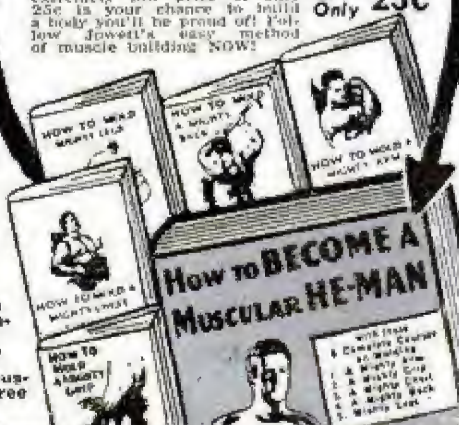
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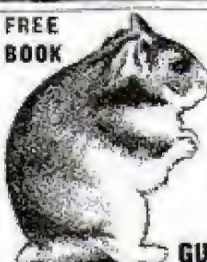
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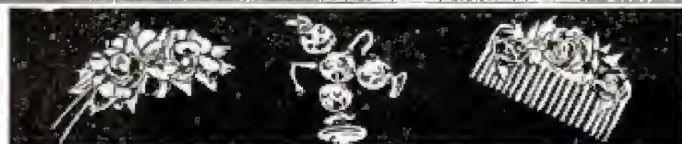
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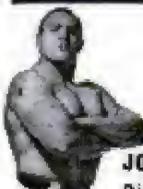
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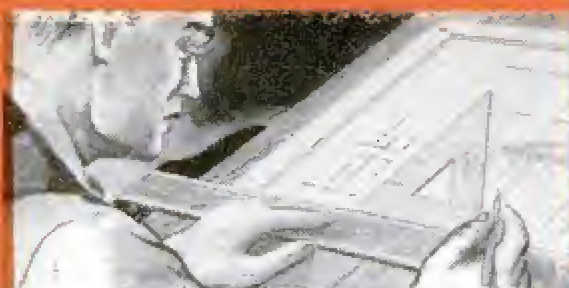
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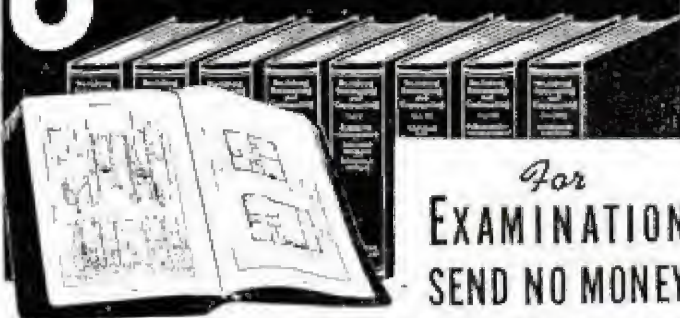
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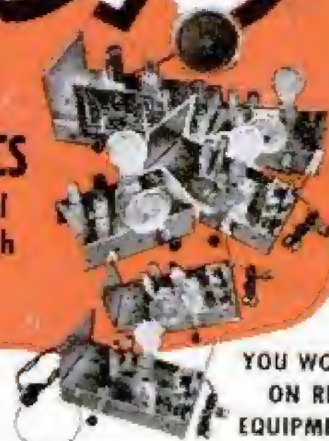
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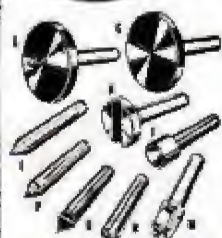
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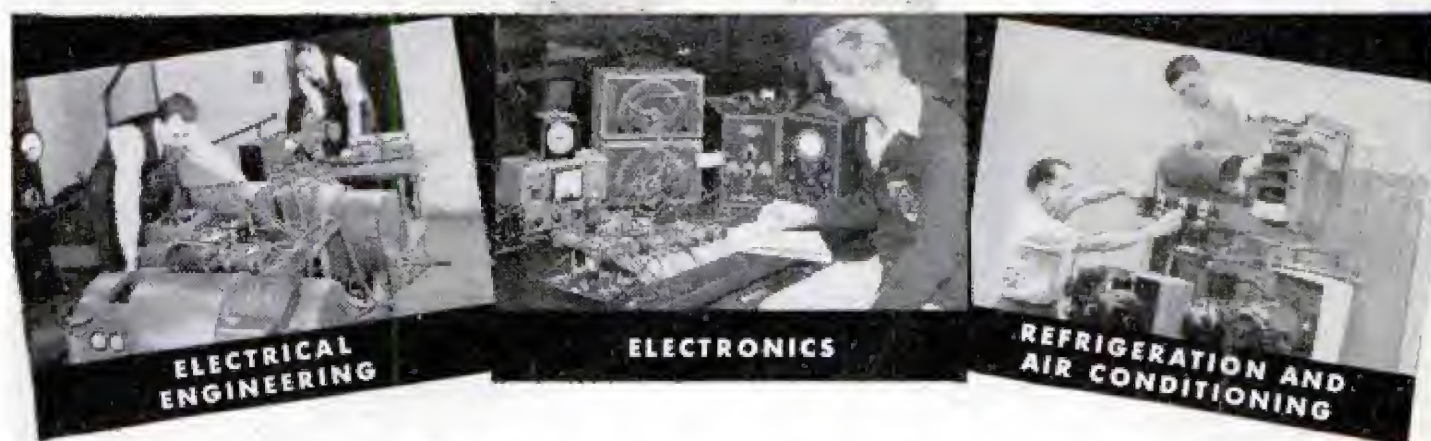
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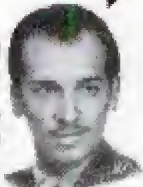
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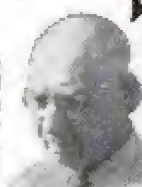
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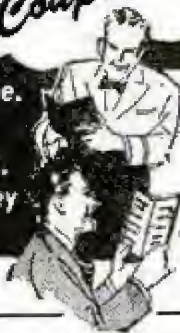


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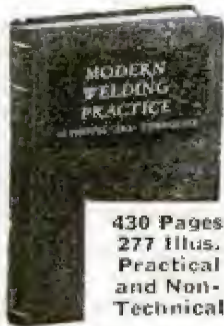


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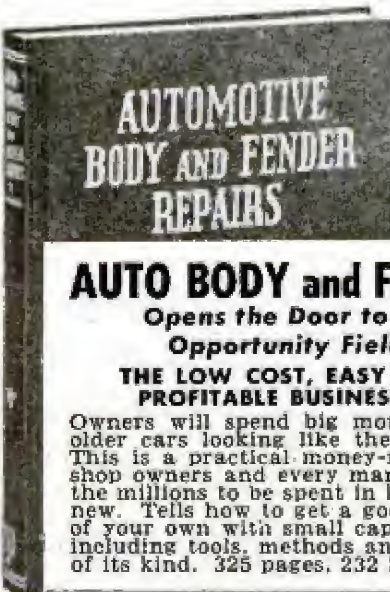
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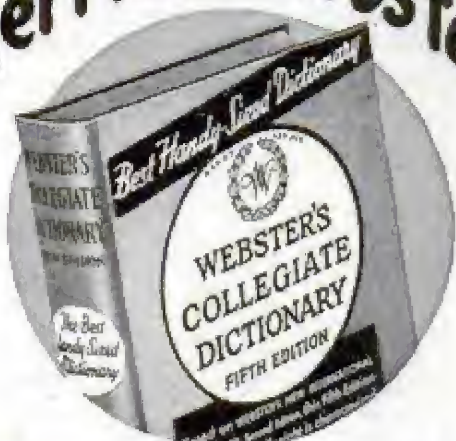
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## MOTORCYCLES, BICYCLES, MOTORSCOOTERS AND SUPPLIES

**MOTORCYCLE** News, monthly. Yearly subscription \$1.00. Latest worldwide information. Motorcycle News, 5424-A Sawyer, Chicago 25.

**BOYS.** Bicycle repair manual, "Illustrated." \$1.00. Klausner Cycles, Shelbyville, Illinois.

**FREE!** Illustrated folder custom motorcycle accessories. New seat covers, bright colors, molded cushions, \$6.75. Leather jackets, \$36.95. Chrome muffler-loudspeaker, \$15. Pacific Cycles, Dept. A5, 1208 Pine, Seattle, Washington.

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**CUSTOM** Car \$25, Ner-A-Car \$35, other midget cars as low as \$12; motorscooters \$10 up; Briggs Stratton engines \$3 up; motorbike conversion \$5; Whizzers \$30 up. Over 5000 tires \$1 up. Mailorder only. Send 25c for Big War-Bargain catalogue No. 24, just out, listing the above and almost 400 other bargains in new and used motors, motorscooters, midget racers, parts, plans, etc. (35c by First Class Mail). Midget Motors Directory, Athens, Ohio.

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**MOTOR** Scooters, bicycle engines. 120 miles gallon. Dime for catalog. Clymer, Dept. A-45, 2125 W. Pico, Los Angeles 6, Calif.

**NEW 1948** Whizzer bike motor now direct express prepaid \$97.55. Installed in Schwinn heavy duty spring fork bike \$164.50. \$20.00 with order, balance c.o.d. Lakeland Sporting Goods, Fort Atkinson, Wis.

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**JET** Propulsion experiments. New design. Drive bicycle. Circular on plans. Rush name. Maupin, Tipp City 8, Ohio.

**GROUNDED Aircraft engines**—Suitable for boats, water-planes, snow-planes, educational purposes, etc. Reasonable. Aero-Traders, Adams, Massachusetts.

**GIANT Kites**. Only \$20. Fraction government's cost. 10x14 ft. double tier. This monster tows cars, skiers, skaters, canoes. Lifts light persons, antennas, advertising, cameras. Pleasure. Profit. Great-Northern Mart, North Adams, Mass.

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**WAR Surplus special**: Big 50 lb. box popular size bolts, nuts, washers, screws, clamps, etc. \$6.85. War Surplus Co., Box 910, New Brunswick, N. J.

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**NEW** Single phase motors—1/6 hp. 1725 RPM J. & Heintz, \$11.75; 1/4 hp. 1725 RPM J. & Heintz, \$13.50; 1/2 hp. 1725 RPM J. & Heintz capacitor, \$14.80; 3/4 hp. G. E. 1725 RPM, \$14.55. These motors are not war surplus, all are new in original manufacturer's cartons. 20% on mail orders, motor inquiries solicited. Jersey State Equipment Company, 180 Mulberry St., Newark 2, New Jersey.

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**NEW** Two speed 110v. a.c. or d.c. ball bearing geared head motors. Develops approximately 1/4 and 1 h.p. at 400 and 500 r.p.m. Suggested uses: Heavy duty drill, power lawn mower, cylinder hones, hoists, etc. \$25.00 each. Ball bearing three to one right angle drives for above motor \$7.50 each. Motor and right angle drive together \$30.00. Limited quantity. Send check or money order, no c.o.d. Prices f.o.b. Machine Design Co., Dunedin, Florida.

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**BINOCULARS**, Telescopes, watches. Buy, sell, trade. Paul Schweer, Donnellson, Iowa.

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**SEE** "Golden Hamster" ad on page 34, and "Hamster Manual" ad on page 38. Each ad shows picture of Hamster.

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**QUICK** Money. "Repairing car batteries." At home! Easy too! Batteryman, Grand Junction, Colorado.

**GET** it for them wholesale. Be community buyer nationally advertised merchandise; radios, refrigerators, washers, sweepers, typewriters, etc. Savings to 50%. This pleasant easy work can earn \$5,000 year. Details free. Cox, 14 Church, Saugus, Mass.

**DOLLARS** in your own business at home. Literature free. Frank Webster, Box 1972A, Hollywood, Calif.

**COMPLETE** Mail order business. Write Joseph Vassar, 312 Harden Street, S.E., Atlanta, Ga.

**RUBBER** Molds. Illustrated list free. Oman, 642-P Broadway, St. Paul 1, Minn.

**MAKE** Profits in mail order business. Astounding plans describing method sent free. Jimton Service, Lock Box 1375K, Mobile 8, Ala.

**WANTED** Unused U. S. postage stamps, small discount. Advance Stamp Company, 24 East 23rd Street, New York.

**WINDSHIELD** Wiper rebuilding brings big profits. Free particulars. H & H Products, Box 430, East Akron 5, Ohio.

**GOODYEAR**—Has natural Malaya 75% heavy brushing rubber for molds. Trial half pint, 50c. Write for full particulars. Goodyear, Lake Geneva, Wis.

**BE** Independent—Operate America's lowest price penny vending machine. Big profits. Immediate shipments. Write for bulletin and prices. Fielding Mfg. Co., Desk (448), Jackson, Mich.

**OPERATE** Your own employment agency. Get into this good paying business. Complete operational plan, sample forms. Postpaid only \$3.00. Jack Sellars, Box 822, Coos Bay, Oregon.

**VARIETY** Store business, large profits. I tell you how to start, \$1.00. Fred Carpenter, Hamlin, Texas.

**MECHANICALLY** Inclined? Resurface butcher blocks. Lifetime business. Roy Crawford, Keyport, New Jersey.

**MAKE** And sell candy professionally. Inexpensive to start. Information free. Box 670, Kissimmee, Florida.

**MAKE** Big money! You can clear 25 to 50 dollars a day in your own popcorn-candy business. Start now! Write for free literature and prices. All electric candy floss machines, popcorn kettles, candy pullers, other big money makers. Concession Supply Company, 3906 Secor Road, Toledo, Ohio.

**FOR** An extremely profitable lifetime business operate a collection agency; credit bureau. Easily learned. Free folder. Cole & Associates, Syracuse 2, N. Y.

**SILVER** Plating, new way. Big profits. Fairchild Company, Mt. Vernon, Ohio.

**OPERATE** Vending machines. Small capital. Long profits. Write T. O. Thomas Co., 1572 Jefferson, Paducah, Ky.

**OWN** Mirror shop. Resilver mirrors. Glass sign making. Electroplating. John Sprinkle, V60, Marion, Indiana.

**PLASTIC** Tablecloth covers, curtains, drapes, baby pants, bowl covers and other plastic articles selling like wildfire! Make big money now! Free details. Write Plastics, Dept. 58-D, 206 N. Fourth, St. Louis, Mo.

**YOUR** Own plastic business at home. Learn to produce costume jewelry, novelties. Use flexible molds. Liquid plastic—marble. Write for free book, American Trades, Box 89-A-5, Cincinnati 29, Ohio.

**MOLD** Makers. Genuine natural latex for rubber molds, only two coats needed for thick mold. Reproduce statuary, plaques. Inexpensive. Write Major Chemical Co., 131A Inman Street, Cambridge 29, Mass.



**WALL Plaques.** Agurine, rubber molds. Emerson, 142 Bay 14, Brooklyn 14, N. Y.

**EARN** Good income in mail order business. Proven methods. Small capital. Details free. Mosley Business Service, Box 3528, Shreveport, La.

**SAWDUST.** Turn it into cash. Six methods. Instructions 25c. Charles, 12-BD, Norwood, Ohio.

**GOLDEN Opportunity** "How to Establish and Operate a Successful Mail Order Business." Free information. Palmer Publications, 4219-A Southwest Marigold, Portland 1, Oregon.

**HOME Workers** wanted to hand-spin Angora wool. Either sex. House of Angora, Springfield, Illinois.

**NEW And unusual product.** Big profits. Repeats. Spare or full time. Details free. R. A. Scheuerer, 1821 Menahan St., Brooklyn 27, New York.

**SAVE!** Half million articles wholesale. Directory 10c. Publishers, Olinger, Va.

**CASH In.** 68 page book, over 40,000 words. 25c. Money-making business secrets. Mail order plans galore. Mail Order Sales, 7905 Birchdale Ave., Chicago 35, Ill.

**BUILD Your own trailer—midget house, utility.** Complete details 25c. Popular Mechanics Press, (C-43), 200 E. Ontario, Chicago.

**A BUSINESS Of your own!** Beautifully bound book, practical plans for over 75 small businesses, compiled by qualified economic analysts. Over 300 fact-filled pages. Cost only \$3.00 with 5-day money back guarantee. If not completely satisfied. Bickford Co., 528-A White Building, Buffalo 2, N. Y.

**FASCINATING Mailorder plans,** legitimate big-profit schemes. Warren, Free-land 1A, Mich.

**OPERATE Profitable mail order business.** Excellent opportunity. Particulars free. Write Reid, 400 Norwood St., Lynchburg, Va.

**SENSATIONAL New roller skate item.** Sells on sight! Field barely scratched. Make big money now! Send \$1.00 for sample and full details. Write today. Pro-Tek-Toe Skate Stop Co., Dept. M-1, 5168-88 Easton Ave., St. Louis, Mo.

**MAKE Big earnings.** Operate an S-I-P Mobile Paint Store as our franchised representative. Make your car earn money for you. No experience or capital required. We train you and get you started right. Full time and part time positions now open. A clean, interesting, healthy and profitable business. Write Standard Industrial Products, Inc., Dept. S-1, Evansville 4, Indiana.

**MANUFACTURE At home your own line of fluorescent bed lamps and desk lamps to be sold to stores.** Complete parts, instructions, diagrams, etc., available. Write E. C. A. Mfg. Co., 2520 W. Montrose, Chicago, Ill.

**RUBBER Moulds made to order.** Send us your models. We will make you perfect moulds. Guaranteed, priced reasonable. Estimates given on request. Star Plastex Co., Butler, Wis.

**METALIZE Baby shoes** for pleasant profits. Write Enterprise, Box 189-MP, Wilkes-Barre, Penna.

**FIFTY Tested mail order plans** for profitable, fascinating home-operation. Full particulars free. Reiss, 3017-S Ocean Parkway, Brooklyn 24, N. Y.

**WANT Independence, regular income?** If prompt, \$5 buys publisher's plan, especially adapted for your community, now getting me over \$60 weekly, sparetime. Hardy Hoover, 40 North Hemlock, Ventura, California.

**OWN Your business.** Everybody chews ball gum. Machines low as \$11.00 new or \$7.50 reconditioned. Best ball gum \$10.00 case 3500 balls. Less in larger quantities. T. O. Thomas Co., 1572 Jefferson, Paducah, Ky.

**AGENT Or exclusive distributor** for cigarette lighter mfg. MacGregor, Tahoe Valley 16, Calif.

**BARGAIN.** \$4.50 Value for \$2.00. Mail order dealers and beginners, free information. V. Jensen, Box 199, Bingen, Wash.

**ONYX And plastic mountings** for bronzed baby shoes, also hardening solution. Box 2095, Wichita, Kansas. (Wholesale.)

**OWN—Operate ball gum, nut, cigarette vending machines.** Amazing profits, no selling. Write for free details, Cameo Vending, Dept. P, 432 West 42nd, New York.

**WANT Pleasant outdoor work** in a business of your own? Good profits selling over 200 widely advertised Rawleigh home/farm necessities. Pays better than most occupations. Hundreds in business 5 to 20 years or more! Products-equipment on credit. No experience needed to start—we teach you how. Write today for full particulars. Rawleigh's, Dept. D-145-PPM, Freeport, Ill.

**METALLIZE Baby shoes.** Excellent profits. New system assures success. Free details. Treasures Forever, 89 Henry Ave., Lynn, Mass.

**PLASTACAST—Intermix,** hardens casting plaster "tenfold." Sample 2 pounds 25c. Standard Products, 1416-EN Fletcher, Chicago.

**BE Wealthy.** Get business self-starters. Own self-paying homes. Midco, 67 S. Harris, Columbus 4, Ohio.

**AT Home — Your own manufacturing business; making popular \$1.00 novelties.** Cost you 3c to 15c. Everything supplied. Write So-Lo Works, Dept. D-600, Loveland, Ohio.

**HOMEWORKERS—\$50.00, \$100.00 Weekly!** Manufacture wood plastic gifts, plaques, novelties. Material, molds, instructions furnished. (Sample mold-kit) complete with production mold, scottle model, big list supplies \$1.00 postpaid. Standard Art Products, 1416-E Fletcher, Chicago.

**IDEAL Business stamping metal key protectors, social security plates.** Information upon request. General Products, 11 No. Pearl (M), Albany, N. Y.

**BELTS! Make 'em and make money.** No tools! Sample 50c. Artistic Leather, 411 Joseph Ave., Rochester 5, N. Y.

**FREE.** 64 Page mail order magazine. Wiggins, Box 207, Lincoln Park 25, Mich.

**WATCHES.** Wholesale. Rebuilt Elgins, Walthams, Bulovas, etc., \$9.75 up; new and used diamond, railroad, 21J wrist. Catalogue free. Brookings, B-1875, Little Rock, Ark.

**"HOW To Build Your Own Mail Order Business."** Idea book for beginners, mail dealers. Quarter. Satisfaction guaranteed. R. Edmonson, 1327 Miller Reed, Atlanta, Ga.

**BABY Shoes preserved.** Formulas, instructions \$1.00. Supplies and bases. Novelty Bronzing, Box 56, Hyde Park 36, Mass.

**BRONZING Baby shoes** is big business. Start your own business for exactly \$3.95. Particulars free. "Metalsealed," Box 2095, Wichita, Kansas.

**GINSENG Big money crop,** easily raised, sparetime, details free. Hobnob Products, Dept. A1, 406 Market St., St. Louis 2, Mo.

**"DO It With Sea Shells."** Profitable easy home work, lesson free. C. Werts, Sharp Park, California.

**START A lost key service** in your community. Brand new. Big home money maker; spare time. Beautiful plastic tag and chain, contains 3 color social security plate; registered serial number; advertising space. Every merchant can use your service. Send 25c for sample and plan. American Specialty Sales, Box 108, Chicago 90.

**LIQUID Marble—Make in any color.** Soundproof plastic flooring. Flexible molds. Cast novelties, plaques, statuary. Big money—your own business. Catalog free. Write—Bing Products, 88-A45 Broad Street, Boston 10, Mass.

**EXCLUSIVE Distributorship** stainless steel whipped cream dispenser. Sold to soda fountains, drug stores and restaurants. Makes 4 pints of whipped cream instantly from one pint of light cream. Operates from refillable gas cylinder. Constant repeat sales of gas assures steady income. Breakstone & Co., 2155 W. Harrison, Chicago 12.

**DRAFTSMEN — Use your professional skill to earn you extra money.** Complete details \$1. J. J. Mills, 126 Lexington Ave., New York City.

**GET Plenty of mail steadily,** samples, catalogs, seedbooks, masses of real bargains and opportunities. Every day a big mail day, when your name is listed in our big mail column. Only \$1.00 for 6 months. Martin's Service, Box 295P, Bassett, Va.

**MAKE—Sell new amazing auto paint** you simply wipe on. Complete formula \$1.00. Ideal Service, Park Ridge 8, Ill.

**HANDY Men—Make quick, easy profits** repairing leaking water faucets with Economy renewable seat tools. Build valuable sales and service business in your spare time. Territories open, literature free. See our display ad this issue. Economy, 3122 N. California, Chicago 18.

**PROFITABLE Mail business.** Instructions \$1.00. Details free. Wisuri, 10 Railroad, Maynard, Mass.

**NEW Liquid plastic.** Earns money for you at home. Make plastic containers for the drug and cosmetic trade. Terrific demand. You make them, we sell them. You can earn a minimum of \$50.00 per week at home. No machinery or experience required. We supply raw materials and instructions; or you can come to our laboratories and receive personal instruction and contract. Write for full details. Travaco Laboratories, P.O. Box 1833, Boston 5, Mass.

**START Your own business! Big money** manufacturing novelties, plaques, statuary. Free catalog. Write Bing Products, 88-A4R Broad Street, Boston 10, Mass.

**AMAZING Ways to make money** at home. Great opportunity. Details free. Ramljak, 2339 W. Charleston St., Chicago 47, Ill.

**SUCCESS, Independence.** 12 new products a year. \$2 brings membership, details, first product, "Painrod," 11th and Lehigh, Philadelphia 33, Penna.

**BE A used car dealer.** Tested plan \$1. or details. Smith, 17A Rockland, Yonkers, N. Y.

**START Home business making statu-**ettes, plaques, artificial marble flooring, liquid marble, flexible molds metalizing baby shoes. Amazing profits. Folder free. Creative, 236-L, Winnetka, Illinois.

**SIGNS Made easily.** Instructions and ten sets modern alphabets, numerals, patterns. Sizes up to eight inches. All for \$1.00. Co-operative Business, 7 West Madison, Chicago 2.

**COLOR Concrete with chemicals.** Formulas, instruction. Sample 10c. Hollywood Cementcraft, 8527-A Wonderland, Hollywood 46, Calif.

**FORTIFY The future—Start own business,** home or office; no peddling, little or no investment. Collection describes 137 money plans. Full particulars free. Wilson, Box 3272, Chouteau Sta., St. Louis 10, Missouri.

**START Home manufacturing business** making Cleaning Compounds, Soaps, Insecticides, Cosmetics, Polishes, Food Flavors. No machinery. Literature free. Kemix, Park Ridge, Ill.

**CAPITAL Raising made easy;** millions available; send for Financing Your Business; large 350 page volume; complete details, only \$2.00. Seminole Publishing Company, Room 9, 317 W. Forsyth St., Jacksonville, Florida.

**MAKE Flexible molds!** Few cents each! Cast plaques, novelties, bookends! Free samples! H. Tooker, Hamilton 44, Ohio.

**EXTRA Money? Free details.** Trable, 1018 1/2 Elm Street, Dallas, Texas.

**OPPORTUNITY Knocks,** big demand. Different. Easily sold. Belmont, Garrett, Indiana.

**RUBBER Molds,** slightly used, \$1.00 each, big selection. Guaranteed Malaya liquid rubber, \$1.25 pint, \$2.00 quart, \$6.95 gallon with instructions and list of confidential trade secrets for mold makers free. Southern Service, Box 3303-A, Jacksonville, Fla.

**RUBBER Molds,** natural liquid rubber, flock filler (for making sectional molds), statuary plasters, felt finishes for novelties. Catalog and "Plastercraft" course free. Blue Rapids Supply, Blue Rapids, Kansas.

**MAKE Money spare time.** Write for details. American Letter, New Market 3, N.J.

**ELECTROPLATING!** Want a money making trade or profitable business of your own? Learn from nationally recognized authority. It's easy when I show you how! Free particulars. Joseph A. Kushner, Metal Finishing Consultant, Stroudsburg 43, Pennsylvania.

**POPCORN Machines.** Potato chip outfits. Long Eakins Company, 4800 Hi Street, Springfield 99, Ohio.

**INVENTIONS Protected in 30 days.** Patents for sale. Patent News, 12M, Washington, D. C.

**MAIL Order business, start at home.** Ideas, plans, many practical formulas. Details free. Kasdorf, 273 Bridge St., Brooklyn, N. Y.

**OPERATE Profitable mail order business.** Splendid opportunity. For details write V. M. McKinley, 78 Ave. "A," Battle Creek, Mich.

**READ "Advance"—The voice of mail order.** Offers money-making opportunities, sources of supply, personal guidance, etc. Issued monthly. Sample copy 25c. Yearly subscription \$2.00. American Mail Trade Association, 313 East 21st Street, Suite 450, New York 10, N. Y.



**ELECTRICALLY** Inclined men. Amazing illustrated literature free, proving \$100-\$250 weekly possible installing, maintaining fluorescent lighting. Rebuild fixtures for excellent profits. Make beautiful lights for 50c each and less. Free sample materials. Write Willis Fluorescent Service, 101 York Street, Brooklyn 1, New York, Dept. C.

**\$46 FROM** Square foot plywood. Jigsaw necessary. Write, Woodarts, X-38, Bridge-water, Mass.

**OPERATE** Profitable mail order business. Write Wailer Service, 4159-A East 112th, Cleveland 5, Ohio.

**BE A** tax consultant. Bookkeepers, etc. qualify quickly. Details free. Smith, 17 Rockland, Yonkers 5, N. Y.

**"HOW To Build Your Own Mail Order Business."** Idea book for beginners, mail dealers. Quarter postpaid. Satisfaction guaranteed. Edgar Gilchrist, 622-M, Massachusetts Ave., N. E., Washington 2, D. C.

**1001 MONEYMAKING** Ideas! Free details. Newway Institute, Box 5463-M, Chicago 80.

**HANDYMEN**—Earn money home operating Community "Fix-It" Shop. Write Stafford, 708 Rawlings, Carbondale, Ill.

**RAISE** Earthworms. Instructions \$1.00. Huffman's Worm Ranch, R.R., Rives Junction, Michigan.

**RE-NEW** Leather and leatherette—Make cloth into imitation leather with plastic discovery called Leather-New. Opportunity to make real profits taking care of sales resulting from national advertising. Write for free sample of Leather-New covered material and complete deal. 4723A Troost, Kansas City, Missouri.

**MAKE** Perfume. Complete outfit \$7.50. Information free. Walter Lawson, 21 Joiner, Saint Augustine, Florida.

**OPERATE** Home business that may mean the road to independence. Write Sunray, 4754-A N. Bernard, Chicago 25, Illinois.

**MEN** And women wanted to place self-selling coin machines in stores, hotels, filling stations, etc. New machine earns up to \$6.00 weekly—costs only \$10.50. We furnish supplies and machines for nuts, gum, candy, stamps, scales and amusements. Free details of tested selling plan. Write Dept. P, Parkway Machine Corp., 523 W. North Ave., Baltimore 17, Md.

**FREE** Literature describing many moneymaking plans. Verner, 108 Delaware, Oakmont 11, Penna.

**A FACTORY** In your home garage! Mfg. and sales rights, mechanics' waterless hand cleaner. \$500-\$800 monthly. No special equipment necessary. Western Aircraft Mfg., Dept. D, Los Angeles 6, Calif.

**DISTRIBUTORS** Wanted everywhere. Large profits. Details, catalog 25c. Re-Bilt, Manitowoc, Wis.

**LEARN** Piano tuning, repairing, at home. Tremendous field! Piano parts, tools furnished. Established 1935. Empire School of Piano Tuning, 806-B East University Ave., Champaign, Ill.

**RECAST** Old batteries into new. Latest achievements. Battery Laboratories, Minneapolis.

**MEN-WOMEN.** "Most everybody likes candy." Learn to manufacture professionally at home. (Our 38th year.) Ragsdale Candies, Dept. 4, East Orange, N. J.

**MAKE** Money casting new 1948 metal toys and novelties. Latest scale model autos, original ashtrays, savings banks, water pistols, etc. Enormous wholesale and chain store demand keeps manufacturers busy. Spare or full time. No experience or special place necessary. Write for details and illustrations of patterns needed. Metal Cast Products Co., Dept. A, 1696 Boston Road, New York 60, N. Y.

**LEARN** To publicize yourself for increased income in your business or profession. Details free. Publicity Systems, Box 322, Jacksonville, Illinois.

**MAIL** Order businesses bought, sold, brokered. Write for free bulletin of exclusive opportunities. Turnipseed, Inc., Box 581, St. Louis, Mo.

**START** Home plaster novelty business. Amazing course tells how. Literature free. Kemo-Courses, 4962 Catalpa, Chicago 30, Ill.

**LIQUID** Marble—Colorful, glossy! Mold, brush, spray. Plastic Ivory, flexible molds, composition floors. Particulars free. Marbleizing Service, Edwardsville, Illinois.

**NATURAL** Molding Latex. Extra thick. Free sample. W. Wooley, 115-A Donald, Peoria, Ill.

**COLORGLAZED** Concrete pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leak-sealing. Money-making projects. Booklet, details free. Men only. National Potteries Company, Grand Rapids, Minnesota.

**MAKE** Rubber stamps. Metalize baby shoes, silver mirrors, make plaster novelties. Catalogue of "20 Ideas" free. Universal, Box 1076-A, Peoria, Ill.

**START** Mailorder bookshop—Everything furnished. 25c brings booklet, samples, exciting ideas. General Publications, Ossining, N. Y.

**MAKE** Liquid marble, flexible molds, statuary, art goods, novelties, artificial marble flooring. Literature free. Komico, Park Ridge 50, Ill.

**LIQUID** Rubber for making flexible molds. Cast novelties. Sample bottle 25c. Free literature. Chaney, 1130 E. 16th St., Jacksonville 6, Fla.

**BIG** Money in vending machines. Smallest capital start brings immediate profits that build permanent profitable business. Starting instructions free. Becker Vendors, 105-A Dewey, Brillion, Wis.

**START** Your own electroplating business, highly paid, uncrowded field. Learn at home in spare time. Send postcard for free electroplating booklet and proof. Plater-Hyde, Room 521, 432 "F" Street, San Diego 1, California.

**METALLIZING** Baby shoes makes you money! Learn this simple, profitable, low investment business from nationally recognized authority. Get professional results with professional "know-how"! Free particulars. Joseph E. Kushner, Metal Finishing Engineer, Stroudsburg 23, Penna.

**RUBACREAM!** Natural rubber latex! Makes molds quicker! Thicker! Free sample convinces! Castcraft Studios, 509-P Fifth Avenue, New York 17.

**TWO** Amazing new typing opportunities. Earn up to several dollars hour, right at home. New, exclusive, different. Write Schroder, 221 E. Bush, Covington, Ky.

**BRONZED** Baby shoe mountings and supplies. All metal bronze bookends, picture frames, ash trays, etc. Onyx ash trays, desk sets, plaques. Hardening solution. 30 amp. plating rectifiers with powerstat control, \$25.00. Geared motors for agitation, \$15.00. Lead lined tanks. Write for list, Hollywood Bronze Supply, 1770 N. Vermont, Hollywood 27, Calif.

**ELITE** Collection contains 137 practical money-making plans; local and mail order. New edition. Particulars free. Elite Co., 220 Grand St., New York 13.

**SELL** By mail—Books and novelties! 35 different items! Large profits! Catalog free! Ellico, 432 N. Wells, Chicago 10.

**OPERATE** Profitable home business selling merchandise by mail. Fast sellers. Large profits. Powell Service, 5713 Euclid, Cleveland 3, Ohio.

**COPUBLISH** Leading m.o. paper. Latest copy Mail Sale Advertiser and proposition, commemorative stamp. Vanroy Shirk, Lebanon, Penna.

**HOW** And where to obtain capital. Fully explained. Particulars free. Star Service, Wapakoneta, Ohio.

**SPECIALTY** Manufacturing, the big money business that can be operated anywhere, start on a very small capital; we supply dependable formulas and complete instructions; get interesting free booklet, "Moneymaking Opportunities in Specialty Manufacturing." Howard Robinson, Ph.D., 1309-A South Ohio Street, Sedalia, Mo.

**\$25 WEEKLY** Working two hours daily. No canvassing. No manufacturing. Lycke, Box 2471, Cleveland 12, Ohio.

**137 WAYS** To make money, in home or office, business of your own. Full particulars free. Elite Co., 220 Grand St., New York 13.

**BRUSH** Plating outfits connect to a battery. No tanks necessary. Good paying business at home plating autoparts, bathroom fixtures, bicycles, reflectors, silvering mirrors. No shop or experience required. Outfits furnished. Free booklet. Gunmetal Co., Ave. H, Decatur, Ill.

**GET** It for them wholesale. Be community buyer nationally-known merchandise; radios, refrigerators, washers, sweepers, typewriters, etc. Savings up to 50%. This pleasant, easy work can earn up to \$5000 year. Get details today. Kraft, Aurora 8, Missouri.

**WOULD** You pay 3%—first \$350 made? Color-illustrated book "505 Odd, Successful Enterprises" free! Some offer occasional "day off." Work home. Expect something odd! Pacific, Oceanside, Calif.

**MAILING** Postcards selling repeat merchandise is profitable. Everything supplied. Details free. Gordan Publishers, Box 23, Pawtucket, R. I.

**CO-PUBLISH** And advertise in The Central Mail Advertiser. Sample copy for stamp. Low rates. Large circulation. Bagby Printing Co., Georgetown, Ohio.

**WHITE** Liquid rubber for making flexible molds! Quick drying! Safe! For home, classroom, or industry! Quart \$2.00. Gallon \$5.95. Full instructions! Beginner's booklet on molding and plaster casting 25c. Free with order! Plastercraft Supply Company, 1408 East 43rd Street, Cleveland 3, Ohio.

**MAIL** Order opportunities. Full or spare time. Hundreds of chances. No charge. Postal brings copy. Blackstone Press, Somerville, New Jersey.

**MACHINES** Available for making new designs of interlocking concrete building blocks. Delaware Industries, Dept. 11, Muncie, Indiana.

**LEARN** Direct advertising, letter shop business. Free booklet, Armstrong, 7219 Broadway, Los Angeles 3.

## MONEYMAKING OPPORTUNITIES

**SELLS** Like mad! Show it once—smacko! It's grabbed! No sales talk. Costs \$2. Brings \$5. Just one of those inexplicable successes. Inquire Stampico, 8837 Quincy, Detroit 4, Mich.

**CONVERT** Burnt out light bulbs into fire extinguishers. Every home a prospect at your own price. Full instructions \$1.00. Details free. Fred A. Lewis, Box 104-A Kensington Station, Brooklyn, New York.

**MECHANICALLY** Inclined? Resurface butcher blocks. Lifetime business. Roy Crawford, Keyport, New Jersey.

**EARN** Up to \$520 month part or full time keeping books for small firms. Simplified system. Write Tax-Saver System, Dept. J, Ft. Worth, Texas.

**SEWING** Machine repairmen make big money lifetime. Start neighborhood shop. Complete repair manual, covering all makes, \$1.98 postpaid. Money back guarantee. Sewmachine Serviceman, Hamilton 9-M, Ohio.

**SURE** Profits statulizing baby shoes. Free details. Schauder's, Dept. F, Shawano, Wis.

**PROFITABLE** Home business. Serigraph printing. Information, samples free. Joseph Bolger, 148 Concord, River Edge, New Jersey.

**FREE** Literature describing fifty proven successful, home-operated mail order plans. Reiss, 3017-D Ocean Parkway, Brooklyn 24, N. Y.

**INSTRUCTIONS:** How to make rubber stamps, luminous paints, money from sawdust, resilver mirrors, raise earthworms. 25c each. All five \$1.00. Davies, Box 1087-PM, Kingston, Penna.

**WHETHER** You're first contemplating or presently in a mail order business. You must read "How to Build Your Own Mail Order Business." A guide to sound profitable mail merchandising. Only 25c prepaid. Satisfaction guaranteed or money refunded. Biga Mailway Sales, 4903 W. Culham Ave., Chicago 41, Illinois.

**REPAIR** Leaking faucets easily with our repairing kit. Write for details. Great Lakes Metal Specialty Mfg. Co., 1450 North Ave., Chicago 22, Ill.

**LOOK** Here! Wanted—Men to start in business on our capital. Sell some 200 farm-home products. Thousands our dealers now make quick sales, big profits. For particulars write Rawleigh's, Dept. D-192-PPM, Freeport, Ill.

**MAKE** Money, paint wall plaques. We furnish plaques small cost. Big demand. Marbleite, Ames Station Box 53, Omaha, Nebraska.

**DOLLARS** For spare time. Send postcard. Free details. Hasco, 110 Ravine, Matawan, New Jersey.

**EARN** Up to \$2,000 year, inventing simple items. Special cash markets. Hendrickson, Argyle 7, Wisconsin.

**I MADE** \$1000.00 from 1000 tomatoes using my unique methods. Detailed instructions, \$1.00 (refundable). Alfred Dinsmore, Marlborough, Mass.

**BIGGEST** 25c Value ever offered! Three big issues "Opportunities Preferred," greatest business building magazine published; plus big, dollar idea "reference directory" book—\$1.75 value, only 25c! Hurry! Coates, Publisher, 88-P, Dorchester, Mass.

**MAKE** Money re-working slightly imperfect beautiful hand carved Chinese chests I import from China. Both camphorwoods and teakwoods. Sell to friends, furniture stores, oriental shops. Wide profit possible. Write for illustrated free folder. Money back guarantee you are satisfied. Chinese Chests, Room 310, 420 Market Street, San Francisco 11, Calif.



**START** Home mail business! Takes only few dollars. No experience—good earnings. "How" folder, free! Shutt, Box 269-B, Newcastle, Indiana.

**MONTHLY** List of 100 brand new products and manufacturers. For mail order, agents, opportunists. Free copy of business plans bulletin with every order. 4 months \$1, 2 months 50c. 1 month 25c. Successful Ventures, 1311 Widener Bldg., Philadelphia, Penna.

**ANALYZE** Handwriting for profit! Complete outfit \$1.00. Graphologists, POB-971, Philadelphia.

**TECHNICAL** Bulletin listing 24 opportunities. Free. Public Educational Service, 493 Irving, Bridgeton 2, N. J.

**\$100-\$200 WEEKLY.** No selling schemes or manufacturing. Charge \$80 up each job takes 8 hours. H. Imlach Co., 2102 India St., San Diego, Calif.

**MAKE** Amazing profits, mailorder business. The best plan I've seen in 20 years. 25c (silver). Different. Satisfaction guaranteed. Campbell Service, Millwood, Ky.

**THOUSANDS** Articles wholesale. "Supply Source Directory" 10c. Ideal Service, Park Ridge 40, Illinois.

**EXTRA** Money? Free details. Trable, 1018½ A Elm Street, Dallas, Texas.

**MAIL—Beginners.** Look before you leap in 1948! Get big information guide to financial independence. Truly the greatest opportunity of the year! Send 15c to cover costs. Leese, 4718 North La-vergne, Chicago 30, Ill.

**METALLIZE** Baby shoes. Further information—3c stamp. Metal Crafts, Box 125-R5, Tampa 4, Florida.

**UNPAINTED** Plaster ornaments. Beautiful designs, easily decorated with water colors or oil paints. Profit or hobby. Illustrated list free. Distributors of new Loxite, a Firestone product, for molds. Midwest Novelty Mfgs., 108A Cedar, Anaconda, Montana.

**WHOLESALE** Anything imaginable. New guaranteed list 25c. Refundable. Laisle Novelties, Box 2188, Waterloo, Iowa.

**RESILVER** Mirrors at home. Formula 25c. Ideal Service, Park Ridge 6, Illinois.

**EARN** Money at home! Thousands do! "Home Worker Magazine" tells how. Sample, 25c. Sizemore, Box 7, 4917 Kostner, Chicago 30, Ill.

**WIN** Contest money. General Contest Magazine gives hundreds of tips. Lists current contests and rules. Sample 25c. General Contests, 1609½ East 5th, Duluth, Minn.

**WOULD** You pay 3%—first \$350 made? Color-illustrated book "305 Odd Successful Enterprises" free! Proven! Work at home, office. Expect something odd! Pacific, Oceanwide, Calif.

**\$246.50 MAKING** Unusual secret device without skill, machinery, from former war material costing \$1.50! Simple, baffling invention, unbelievably profitable! Illustrated proofs free. Rolls Enterprises, 115-D West 16th, New York 11.

**FORTIFY** The future! Start own business; home, office. Booklet describing "Collection of 137 Tested Plans" free. Elite Co., 220-A Grand St., New York 13.

**PUBLISH** Your own magazine. Hand-some 52 page format, well edited, illustrated. Cost low as \$1.00 month. Brings you prestige, profits. 25c brings sample, details. National. Ord. Nebr.

#### FORMULAS, PLANS, ETC.

**21 POPCORN.** Candy apple, etc. formulas. All popcorn-makers. \$1.00. We can supply equipment. Concession Supply Co., Dept. "A," Box 133 Sta. "B," Toledo, O.

**FORTUNES** In formulas. Ten thousand trade secrets, recipes, processes. 900 pages. Only \$3.00 postpaid. Nates Supply, Dept. PM, 1090 West 43rd, Norfolk 8, Va.

**MANUFACTURE** Cleaners, soaps, polishes, flavors, cosmetics. Literature free. Kemico, Park Ridge 16, Illinois.

**10,000 FORMULAS** And trade secrets. Free literature. Stillman, 555 Kingston Ave., Brooklyn 3, N. Y.

**REAL** Manufacturing formulas. Lists free. Cummings, Chemist, Gordon Ave., Syracuse 4, N. Y.

#### PLASTICS

**INTERNAL** Carved swans, bluebirds, goldfish, butterflies, etc., pins, \$1.50. Rose or daisy costume jewelry sets, \$1.50 less findings. Also gifts and novelties. Crystal Floral Novelty Co., Somerville, New Jersey.

**MOLDS** Made to order. Send us your models by insured parcel post. Models returned unharmed. Work guaranteed. Literature 25c. Apex Art Plastics, 2126 Marconi, St. Louis, Missouri.

**PLASTIC** Carvers drills 75c ea. Supply catalogue free. Procliv, Box 618, Seattle 11, Wash.

**PLASTIC** Injection machine. Plexiglas, jewelry findings, self designing paints, chrome initials. Internal carving drills, kits. Catalog. G. Baker Company, River Edge, New Jersey.

**LUCITE,** Plexiglas, Masked sheets. All sizes. Cost square foot (12"x12") 1/16" 90c; 1/8" \$1.16; 3/16" \$1.43; 1/4" \$1.68; 5/16" \$2.09. Include 10% postage. Lucite kit \$3.00. Almac Plastics Inc., 230 Fifth Ave., New York 1, N. Y.

**PLEXIGLAS.** Clear, masked. Prices per square foot. 1/16"—\$1.00, 3/32"—\$1.15, 1/8"—\$1.25, 3/16"—\$1.50, 1/4"—\$1.80, 5/16"—\$2.60, 3/8"—\$3.40, plus 10% postage; all colors 10% additional. Rethel Plastic Co., 15 Walnut St., Steelton, Penna.

**BARGAINS** in plastics. Lucite, Plexiglas, Catalin. Many colors and sizes. Details free. George Plastics, 6938A George St., Chicago 34, Ill.

**PLEXIGLAS,** 6 Pieces, red, black, white, green, yellow, blue. Instructions, cameos, supplies to make set two tone costume jewelry. \$1.00. Bradlee, P.O. Box 142, Buffalo 6, N. Y.

**PLASTICS** Trade secrets. Write for free information. Enclose 25c if you would like plastics samples. Plastics Research, Box 346, Alhambra, Calif.

**RENEW** Leather and leatherette—Make cloth into imitation leather with plastic discovery called Leather-New. Opportunity to make real profits taking care of sales resulting from national advertising. Write for free sample of Leather-New covered material and complete deal. 4723B Troost, Kansas City, Missouri.

**PLEXIGLAS—Masked** sheets, 12"x12", 1/16"—\$1.00, 1/8"—\$1.25, 3/16"—\$1.55, 1/4"—\$1.85. Include 10% postage. Internal carvings. Drills, dyes, Luminous powders, rods, tubes, cements, jewelry findings. Free catalogue. Craft Plastics, Somerville, N. J.

**PLASTICS—Sheets,** rods, tubes, all colors; dyes, supplies; findings. Illustrated fabricating manual, prices, 10c. Lucite sample, 35c. Gem-O'-Lite, Box 686F, North Hollywood, Calif.

**PLASTIC—Sheets,** rods, tubes, etc. Free list. Plastic Supply Co., 2613 St. Louis Ave., St. Louis 6, Mo.

#### CHEMISTRY

**LEARN** Chemistry at home, from the house of Winn. Home of supplies for student chemists. New idea chemical and apparatus outfits for home experimenting. Semi-professional microscopes and accessories. Send 10c for retail catalogue. Established 1931. John H. Winn, Dept. 504, 124 West 23 Street, New York 11, N. Y.

**LABORATORY** Supplies, chemicals, glassware, etc., low prices. Large catalogue 15c. Microscopic stain catalogue 20c. Both for 25c. National Scientific Company. Established 1908. 2204 W. North Ave., Chicago 47, Ill.

**CHEMICAL** Laboratory, used; equipment, chemicals, glassware, books, etc. Sacrifice price. Lacy Boyer, Woodstock, Va.

**CHEMICALS** And apparatus for industrial, analytical and private laboratories. Complete supply service for correspondence school students. Send 10c for catalog. Dept. M-43, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 7, New York.

**FREE** Catalog: Chemistry, mineralogy, physics, biology. Tracey Laboratories, Evanston, Illinois.

**CHEMICALS—LAB.** Supplies. New catalogue 10c. Mel-Glo Chemical Co., 258 Fourth Avenue, Brooklyn 15, N. Y.

**APPARATUS.** Chemicals, ounce quantities, catalog 10c. Fleischer's Laboratories, Everett 49, Mass.

**HANDBOOK** For chemical experiments. Illustrated. hundreds of experiments. 50c. Experiment booklet 15c. Supply catalogue 5c. Reading Scientific Company, Reading, Penna.

#### HELP WANTED

**RELIABLE** Man with car wanted to call on farmers. Wonderful opportunity now. \$15-\$30 in a day. No experience or capital required. Permanent. Write today. McNess Co., Dept. 78, Freeport, Ill.

**BOYS** Wanted. Over \$50 week! Sell name plates for front doors. Write National, 214-U Summer, Boston, Mass.

#### AGENTS WANTED

**AMAZING** Discovery. Miracle glaze puts brilliant glass-like surface on cars. Free sample, information. Big profits. Miracle Glaze Company, 8714 S. Austin Ave., Oak-lawn, Illinois.

**DO** You want \$25? Show lovely all-occasion greeting cards, stationery, gift wrappings, to friends, neighbors, co-workers. \$25 profit on 50¢ boxes. Free literature shows beginner easy way to make money. Approval samples. Torres Company, 8A St. Francis Place, Brooklyn 16, N. Y.

**100% PROFIT.** No investment. Handle quality Photostamps. Amazing glossy photographs, gummed stamp form. Business year round. Free samples, particulars. American Photo Stamp Co., 103 East 125th St., Dept. PM4, New York 35.

**60c PROFIT** Each \$1 sale! Sell real microchipping solution. Employ agents. Experience unnecessary; we tell you how. Kinford, Wayne 3, Penna.

**SELLS** At sight. Stainless steel carrying sets \$21 doz. Samples available. 125 other fast sellers. Manufacturers, 264-5th Ave., New York.

**WHOLESALE!** Balloons, novelties, watches, jewelry, premium goods. Collins Co., Forsyth, Georgia.

**DOUBLE** Duty shopping bag. Zips open. Instantly changes from small to large size. Lightning seller. Samples sent on trial. Kristee, 121, Akron, Ohio.

**POCKET** Pal: Replaces pocket knives. New, safe, beautiful. Always razor-sharp. 60c seller. 231% profit. \$15.00 or more daily. Agents, salesmen, distributors. Sample 10c. Nelson Mfg. Co., 222 W. Kellogg, St. Paul 2, Minn.

**AMAZING** Sales. Giant profits. With new electric flasher sign direct from manufacturer. Send for catalog. Pricing Press, Dept. P-2, 124 White St., New York, N. Y.

**AGENTS** Wanted for Tiresignal. Fast selling device. Eliminates flat tires on automobiles. Sample \$1.00. Tiresignal, Dept. A, P.O. Box 1867, Los Angeles 32, California.

**FARMERS!** Make more money. Your own boss. Outside work. Steady year-round. 200 farm-home necessities. No experience necessary. We train and help you. For details write Rawleighs, Dept. D-842-PPM, Freeport, Ill.

**CREW** Managers, wagon, jobbers, agents! Established manufacturer can supply you with top quality floor waxes and polishes all sizes from pint to drum. Write Windsor Wax Co., Inc., Dept. PM-3, Hoboken, N. J.

**AT Last!** Something new and sensational in everyday cards. New gorgeous satin and velvet designs. Get orders fast. Big profits. Imprinted stationery. 14 assortments for year round occasions. Retail 60c to \$1. Get samples on approval. Puro Co., 2801 Locust, Dept. 840-B, St. Louis 3, Mo.

**A Dress** yours with every 3 you order for yourself and family. Amazing new bonus plan. Everything free. Harford Frocks, Dept. L-9128, Cincinnati, Ohio.

**SPRING** Months offer money making opportunities. Easy sales. Unlimited market in your community. Our helps build business. Write for free wholesale catalogue today! McGregor Magazine Agency, Dept. 12, Mount Morris, Illinois.

**EARN** Extra money selling greeting cards. Free details. Pascale Card Service, Irvington 11, N. J.

**AMAZING** Offer—\$25 is yours for selling fifty \$1.00 boxes of entirely different, new deluxe all-occasion cards. Each box sells for \$1.00, your profit 50c. It costs nothing to try. Write today for samples. Cheerful Card Co., Dept. 297, White Plains, N. Y.

**\$1 STARTS** You in business! Sell deluxe ties, 100% wool interlining. Costs you only \$7 per dozen, you make \$5.00 dozen. Send \$1.00 for special introductory offer two deluxe ties. Catalog complete line free. Philip's Neckwear, 20 West 22nd St., Dept. K-22, New York 10.

**SELL** Gold embossed monogram stationery. Sample free. Dunbars, Sanford, Florida.

**FAST** Selling line greeting cards. All-occasion sample box on approval. Big personalized line stationery, matches, playing cards, coasters, napkins and guest towels. Free stationery samples. Senrab Co., 212E W. Washington St., Syracuse, N. Y.

**NEW** Company requires agents throughout country. Send \$1.50 for sample. Refunded if not interested. Kahree Co., 97 Joline Ave., Staten Island 7, N. Y.



**FREE** Nylons given if Kendex hosiery runs or snags! More words could not possibly express the almost unbelievable opportunity you now have to make money taking orders for the world's only complete line of women's beautiful hosiery actually guaranteed against everything! Free replacements made regardless whether cause is use or abuse. Not sold in stores. Here is sales dynamite that will blast your earnings to the sky. Even if you never sold a thing in your life, three magic words "Guaranteed Against Everything" are enough to make women eagerly buy. Complete line includes sheer and service nylons, rayons etc. in different lengths. You need no money or experience. Simply write orders. We deliver and collect. Liberal advance cash earnings plus huge cash bonus. Write orders spare or full time; exclusively or as a side line. Everything you need to start making money furnished free and prepaid. Just send name and address on postcard for your free outfit. No obligation. Write Dept. 126. Kendex Co., Babylon, N. Y.

**SILVER** Cleaning, plating, polishing, liquid (NuSilver). Apply with cloth. Renew silverplated ware, articles, pieces. Silverplates brass, copper, bronze. Female, male, agents wanted, part or full time. NuProcess Products, Aurora, Ill.

**CAPITALIZE** Now on housewives' fear of prowlers, housebreakers, petty thieves. Sell automatic open window lock that locks window in any position, prevents further opening of either sash. Dealer-agents wanted, so send \$1 retail price for sample or \$6 for dozen today. No c.o.d.s. Burbridge Mfg. Co., Dept. PM4, Kenosha, Wis.

**PROFITS** To 100% selling everyday greeting card box assortments. Birthday, convalescent, wrappings, stationery, etc. Details and assortment on approval. Glorian, Dept. 22, 515 East 45th Street, Brooklyn 3, N. Y.

**EARN** \$200 Weekly installing new amazing "Styron" plastic wall tile in homes, offices. Easily applied. Tile your own kitchen, bathroom, too. Instructions, everything furnished. Literature free. U. S. Tile Co., 30 W. Washington St., Chicago 2, Ill.

**AGENTS** Sweet smelling perfume novelties sell on sight. Gorgeous samples. Free particulars. Mission, 2328R West Pico, Los Angeles 6, Calif.

**SELL** "Baskit"—The patented folding work basket. Card brings details. Lewis W. Martin, 665 S. Ann St., Lancaster, Penna.

**NEW!** Big profits taking orders for our fine picture enlargements on beautiful hardwood sparkling plastic front plaques. Customers everywhere! Gotham Products, Box 5427, Philadelphia 43, Penna.

**SELL** Ultra blue stock signs to stores, 1000 slogans, comedy, general, religious. 7x11, cost 6¢, sells 35¢. Make money. Sample free. Lopy, 8 West Broadway, Dept. 373, New York City 7.

**AMAZING** Daily profits, big repeat business selling famous top-quality, lowest priced men's hosiery, full or part-time. Experience, investment unnecessary. Free selling outfit. Coltsco, 242-J4 Purchase, Boston 10, Mass.

**START** Your own business on our capital. Always your own boss. Hundreds average \$6,000 to \$25,000 annual sales year after year. We supply stocks, equipment on credit. 200 home necessities. Selling experience unnecessary to start. Wonderful opportunity to own pleasant, profitable business backed by world-wide industry. Write Rawleigh's, Dept. D-U1-PPM, Freeport, Ill.

**BIG Profit!** New helicopter flies indoors, outdoors! 14" rotors, rubber motor. \$4.26 doz. Refundable, \$1.00 two samples. Helicotoy Co., FDR8, Dallas 11, Tex.

**BIG Profits** selling beautiful imprinted stationery, greeting cards, etc. Free samples. The Ed-Brite Co., 435 North Terrace Ave., Mount Vernon, New York, Dept. 15.

**FACTORY** Agents-dealers. Gas mower (Maytag), \$99.50. Photos free. Rotacut, M-2004, Excelsior Springs, Mo.

**UNLIMITED** Commissions taking orders. Colorful pocket perfume atomizers. Prospects everywhere. Dynamic Sales, Box 3552M, Cleveland 18, Ohio.

**SELL** Process embossed business stationery. Samples free. Sperry's, Williamsport 10, Penna.

**SELL** Royal blue stock signs to stores. 17 sample signs \$1.00, postpaid, sell 35¢. Make money fast. All-Art, 179 N. Wells, Chicago 6, Ill.

**EARN** \$5.00 With every ten \$1.00 boxes of everyday cards you sell. Also personalized stationery, note paper and wrappings. Send for samples today. Howard P. Ellis, Dept. PM-5, Pitman, N. J.

**AGENTS** Make big profits selling sensational new diapers which require no folding. Every new mother a prospect. Rush name for free sample. Fred Dexter and Staff, 234 West 17th, Houston 8, Texas.

**DEALERS**—Distributors: Exclusive territory open. Cash in on steady sales with new art cleaner. Self-wringing, self-cleaning sponge rubber mop; scrub, wipe, dust, wax floors, wash walls. No franchise fee. You buy merchandise, make sales, and you profit on every dollar you invest in stock. Artmoore Co., Dept. P-48, Milwaukee 12, Wis.

**MONEY** Every day. Take orders for our lifetime photo-plaque, they sell on sight. Made from any photo, snapshot or negative. Send for free details. Quaker Photo-Plaque Co., 914 Walnut Street, Philadelphia 7, Penna.

**AMAZING** New window cleaner concentrate. Works fast. 300% profit. Whirlwind seller. Sample for stamp. Edwards Products Co., Box 653, Davenport, Iowa.

**DEALERSHIPS.** Sweetline No-Rub Refinish, revolutionary cleaner-polisher. Instantly cleans, renews, preserves, leaving high gloss finish on hard surfaces without rubbing. A one-time-over principle. Dries immediately. For factories, stores, hotels, banks, theatres, restaurants, lobbies, bars, etc. Repeat sales. Utilized by army, now available generally. H. C. Sweet Co., 3727 Fenkell, Detroit, Michigan.

**AGENTS**—To sell our sensational Adjust-Kwik light to body shops, garages, etc. Hosrent, 10830 Grand Ave., Melrose Park, Illinois.

**EARN** \$25 A day and more selling nationally advertised aluminumware, silverware, pressure cookers and jewelry. It is simple, let us show you how to make big profits with no investment. Write Continental Products, Dept. B4, 30 Ormsbee Avenue, Providence, R. I.

**QUICK** Cash. Salesmen, make \$10.00 to \$15.00 daily with only six shoe sales. Good future, liberal bonus. Invest nothing; experience unnecessary. Over 60 styles. Geo. Merritt Shoe, M2, Brockton, Mass.

**DISTRIBUTOR** Salesmen wanted to wholesale guaranteed Reflex Spark Plugs as a sideline to dealers, garages, service stations, fleet owners. Big profit. Repeat orders. Exclusive territory. The Reflex Spark Plug Co., 10902 Madison Ave., Cleveland 2, Ohio.

**MAKE** Money at home like I do! Write immediately. Duffy, Covington, Ky.

**UP** To 122% profit! "Mad-Nets," \$1.00 novelty magnets. Free bulletin. Frederick, 4 South, Stamford, Conn.

**MAKE** Big initial commissions and steady repeat money selling Pronto Stencil Duplicators and Pronto Photocopy Equipment. Write for free sales kit, indicating interest in one or both lines. Pronto, Inc., 515 Dempster, Evanston, Ill.

**AGENTS**, Distributors—Personal name plates for homes, office. Big profits. Al Peterson Associates, Box 822, Providence 1, R. I.

**\$3 FIRE** Extinguisher; quick sales, wholesale or direct; liberal profits. "Fire-Killer," 109 N. Franklin, Syracuse 1, N. Y.

**BIG** Money selling tooth powder. Write today. James Walker, 633 Plymouth Ct., Chicago, Ill., Dept. 1.

**FREE** Sample! Big profit opportunity with amazing glow-in-the-dark house numbers, switch plates, pictures, decals, religious articles. Represent large manufacturer, Madison Mills, 303 Fourth Avenue, New York, N. Y.

**MAKE** More money selling personal initialed individualized belts, buckles, cap badges, tie holders. 2000 emblems to choose. Big profits, whole or part time. Write today special outfit offer. Hookfast Specialties, Box 1425, Dept. 6, Providence, R. I.

**FREE** Water and our concentrates, makes flavors, lotions, shampoos, 73 products, labels, bottles furnished. Qualco, E-26030 Russell, Detroit.

**INFORMATION**—Wholesale supply sources. Money-making plans. Increase your income! Write Reynard Service, Smithfield 3, Ohio.

**AGENTS**—Big line including food products. Fast selling premium and bargain deals. Low prices. Send card for big outfit offer with gift. Ho-Ro-Co, 2725 Dodier, St. Louis 7, Mo.

**100% PROFIT** With new electric gas lighter, eliminates matches, pilot. Write Optical Research Products, Fairview, N. J.

**EXCELLENT** Sideline for printing and advertising salesmen. Decalcomania name plates in small quantities. Great demand. Also, make money with our line of automobile initials and sign letters. Free samples. "Ralco" XL-Roxbury, Boston 19, Mass.

**MAGIC** Cleaner, and laundry soap deal. Hotter than a firecracker. Big profits. Sample free. Bestco, 5007 Irving Park, Chicago.

**137 COMPLETE** Plans for starting own business: local—mail order. Particulars free. Elite Co., 220 Grand St., New York 13.

**AGENTS**—300% Profit selling genuine gold window letters; stores and offices. Free samples. Metallic Letter Co., 438-B North Clark, Chicago.

**GOLD** Lacquered window sign letters. Large sizes penny each. New foils. Absolutely beautiful. Free samples. Atlas, 544 W. 79th, Chicago 20.

## HIGH-GRADE SALESMEN

**SALESMEN** Will clean up this year selling our electric fans and sump pumps. Write Universal Fan Co., Peru, Indiana.

**BALLOONS**, Balls, rubber dolls; fireworks; battery powered toy automobiles. Profits plenty. Ellsworth Distributors, LaJunta, Colorado.

**SELL** Over 1100 items—Electric flasher signs, adding machines, tags, tape, all printed necessities, pencils, restaurant supplies, and many others. Free sales portfolio. No experience necessary. David Lionel Press, 312-Z So. Hamilton Ave., Chicago 12, Ill.

**EARN** \$25 A day and more selling nationally advertised aluminumware, silverware, pressure cookers and jewelry. It is simple, let us show you how to make big profits with no investment. Write Continental Products, Dept. B, 30 Ormsbee Avenue, Providence, R. I.

**PHOTO-SALESMEN**—Agents. Sell beautiful hand colored plastic enlargements. Collect deposit, we deliver. Profitable sideline. Send card, for free sample kit. Novel Portrait, 3343 North Ave., Chicago, Illinois.

**REPRESENTATIVE**—Selling high quality nylon hosiery and lingerie to stores. Excellent sideline for traveler now contacting general and department stores. Dept. 1. Rosalce Hosiery Co., 326 Main Ave., Clifton, N. J.

**BUILD** Steady, large, reliable advertising specialty business. Lowest prices, largest profits on key cases, electric flasher signs, book matches and hundreds of others. Free sales portfolio. Willens and Company, 2130-Y Gladys Ave., Chicago 12, Ill.

**START** Your own business on our capital. Always your own boss. Hundreds average \$6,000 to \$25,000 annual sales year after year. We supply stocks, equipment on credit. 200 home necessities. Selling experience unnecessary to start. Wonderful opportunity to own pleasant, profitable business backed by world-wide industry. Write Rawleigh's, Dept. D-U-PPM, Freeport, Ill.

**SALESMEN**: Big money showing building owners sensational product; cuts essential repair cost up to 75%. Six average orders weekly pay you over \$190.00. Age: 30 or over. Get money-making facts. Write, Zone Co., Dept. D-6, Box 789, Ft. Worth 1, Texas.

**ADVERTISING** Book matches—Cash in on political campaigns; sell union label matches. Cuts for all businesses, political parties. Free powerhouse selling kit, low prices, protection guaranteed on repeat orders. Cash commissions. Superior Match Co., Dept. M45, 7530 Greenwood, Chicago.

**AMAZING** New zipper shoe sells on sight. Big cash profits for salesmen. Leads line 200 splendid styles. Territory open. Get free sample outfit. Write Consolidated, Dept. S-49, Chippewa Falls, Wis.

**SELL** Delicious candies, nuts, gum. Immediate delivery. Write Casterline, 2031-PF Sunnyside, Chicago 25, Illinois.

**SALESMEN**. Here's a natural. New patented tool multiplies man's strength 31 times. Sell retailers. Needed by autoists, farmers, lumbermen, builders, transporters, garagemen, public works. Immediate deliveries from our U. S. plant. Write or wire for attractive proposition. Palcoseel Co., Ltd., Cornwall, Ont., Canada.

**SALESMEN**. Earn \$100.00 weekly, selling only six pair shoes daily. Commission and bonus. Wide variety for men, women, children. No investment. Experience unnecessary. Tanners Shoes, 231, Boston, Mass.

**CALENDARS**—Printing—Complete line, book matches, metal novelties, advertising specialties. Experience unnecessary. Big commissions advanced. Free samples. Rob-Ren Studio, 625-A Jackson, Chicago 6.



**EARN** Money selling multi color tinsel religious mottoes. Size 8x10 — \$1.00 for sample of 15. Lamey Motto, Versailles, Ohio.

**AMAZING** Daily profits, steady repeat business selling famous Colt shoes direct. Exclusive features make selling easy. Experience unnecessary. Patented Footograph assures accurate fitting. Free selling outfit. Colt Shoes, 601-J4 Atlantic, Boston 10, Mass.

**WANT** Pleasant outdoor work in a business of your own? Good profits selling over 200 widely advertised Rawleigh home/farm necessities. Pays better than most occupations. Hundreds in business 5 to 20 years or more! Products—equipment on credit. No experience needed to start—we teach you how. Write today for full particulars. Rawleigh's, Dept. D-145A-PPM, Freeport, Ill.

**AUTOMATIC** Fire extinguishers. Red Ball Co., Box 1552, Salt Lake City, Utah.

**\$240.49 IN** One week—Unusual? Not at all! Just look at one week's earnings of these representatives. WWS \$290.99, JMH \$229.75, RJR \$262.47, VJM \$275.95, JEA \$240.49, RWP \$231.21. Direct mail campaign brings hot leads right into your home. Remarkable product does part of 10 men's work; a "natural" during these labor problem days. Has perfect sales story; sells year 'round. As modern as radar! Special demonstrator offer. We extend credit, deliver and collect. No capital required; no experience necessary. You make big profit on first sale and full credit on repeat business. Every business, store, factory, etc. are prospects. Write John Porter, 2433 Indiana, Dept. 306, Chicago 16.

**AGGRESSIVE** Salesmen. To keep stores supplied with self-selling 5c and 10c counter-card products. Nationally advertised throughout the year in leading magazines and more than 2300 newspapers. Biggest profits, full time or sideline. Write today. World's Products, Dept. 10-B, Spencer, Ind.

**AMAZING** Discovery. Master Glaze puts brilliant glass-like surface on cars. Free sample, information. Big commissions. Master Glaze, Dept. 647, 7720 Harwood, Milwaukee, Wisc.

**BIG** Profits daily taking every family's magazines subscriptions. Give unlimited choice of valuable books free. Publishers, 323-5 Hammond, Cincinnati 2, Ohio

**WE** Manufacture paradichlorobenzene moth blocks. Other chemical products. Guaranteed money makers. Banner, 85 Ludlow, New York 2, N. Y.

**CASH** Profit—Big earnings; selling personalized buckles, belts, cap-badges, tie clasps, 2000 emblems, caps, shirts, ties. Write, Hook-Fast Products, Dept. A, Columbus 6, Ohio.

**WAGON** Salesmen—Fast moving carded goods and 10c line. Long profits. Free facts. Peerless, 2720 Dodder, St. Louis 7, Mo.

**BIG** Cash profits daily taking orders: uniforms, shirts, ties, personal initialed individualized buckles, belts, cap badges, tie holders, 2,000 emblems. Repeats. Write today. Special outfit offer. Hook-Fast Company, Box 480-PM, Roanoke, Virginia.

**JOBS** Open in selling! Send name, address for free copy Opportunity Magazine, listing hundreds of companies who need men now, full or spare time. Experience not essential. Opportunity, 28 E. Jackson, Dept. 17, Chicago 4, Ill.

**BIG** Money taking orders. Shirts, ties, Sox, pants, jackets, sweaters, shoes, uniforms, etc. Sales equipment free. Experience unnecessary. Nimrod, 4922-AN Lincoln, Chicago.

**SELL** Calendars—Every business a prospect. Also wholesale to printers; calendars, sheet pictures, Fleming Calendar Co., 6546 Cottage Grove, Chicago 37.

## EDUCATIONAL AND INSTRUCTION

**WANT** U. S. Gov't job? Big starting pay. Security. Men-women. Vets get preference. Qualify now for next examinations. Sample lessons—Details free. Apply Franklin Institute, Dept. A24, Rochester, N. Y.

**SAY** Goodbye to job hunting. Get a life-time government civil service job. Men-women. Write for free booklet: "How to Get a Government Civil Service Job." Lincoln Institute, Dept. P-2, 7951 Yates Ave., Chicago 17, Ill.

**NOW** You can have an office. Learn credit-collection business by new home study course. Many earn up to \$5000-\$15,000 annually. Free bulletin. Franklin Credit School, Dept. 202D, Roanoke 7, Va.

**"HOW To Break and Train Horses"**—A book every farmer and horseman should have. It is free, no obligation. Simply address Beery School of Horsemanship, Dept. 1104, Pleasant Hill, Ohio.

**GRADUATE** Work in all subjects. Degrees available in one year. Resident and extension classes. Golden State University, Hollywood, Calif.

**BOOKKEEPERS!** Increase your earnings! Operate your own simplified "dollar-a-week" bookkeeping and tax service. Full or spare time. Details free. No obligation. Ellis, Box 16-D, Cedar Grove, North Carolina.

**3800 LATEST** Used correspondence courses. Catalog 50c. EG, Elmsford, N. Y.

**WELDING**—A profitable trade. Demand for trained men. Learn quickly at best equipped school in U. S. G. I. approved. Catalog free. Write Hobart Welding School, Box M-487, Troy, Ohio.

**DENTAL** Technician training. Easy home study in spare time. Dental Crafts and Sciences, P.O. Box 1321, Palo Alto, Calif.

**COURSES** in jewelry instruction: watchmaking, engraving, jewelry repairing. G.I. approved. Two fine schools—Pittsburgh, Pa., and Warren, Ohio. Write for free illustrated catalog. Immediate enrollment. Veteran housing available. Low rates. A. W. Thacker Academy for Jewelers, 423 Federal Street, Pittsburgh 12, Penna.

**SHORTHAND.** Learn in 20 days. \$1.00. Gaer, 1212 Lincoln Place, Brooklyn 13, N. Y.

**VALUABLE** Information on your memory, famous feats of memory; super-memory; free. Write today. Thor Books, CM-4, Box 1210, Chicago.

**USED** Correspondence courses and educational books, bought, sold, rented. Catalog free. Educational Exchange, Summer-ville, Georgia.

**MATHEMATIC** Tutoring. Specify wants. Math Tutor, Box 1214-A, Indianapolis 6, Indiana.

**USED** Correspondence courses and books bought, sold, rented and exchanged. Catalog free. Lee Mountain, Pisgah, Alabama.

**LINGUAPHONE** Makes languages easy. At home learn to speak Spanish, Portuguese, Italian, French, German, Russian, by quick, easy Linguaphone Conversational Method. Save time, work, money. Linguaphone correspondence courses are available to veterans under G.I. bill of rights. Send for free book. State if G.I. Linguaphone Institute, 83 RCA Bldg., New York 20, N. Y.

**LEARN** Air conditioning at home. Big demand for trained men. Enormous profit opportunities. Write Nelson, Box 8-C, Warner Robins, Ga.

**INVESTIGATOR** Training. Phillips Secret Service, 1917B North Kenneth, Chicago 39, Illinois.

**NEW** Writers needed. Want to cash editors' checks? If you can read, we can teach you how to write for pay. Earn as you learn. First lesson free on request. No obligation. Send postcard today. Comfort Writer's Service, 300 S. 7th St., Dept. 11, St. Louis 2, Mo.

**LEARN** Photo-engraving at home or in oldest, largest school in America. Work for newspaper or establish own profitable business. New Tasope® Photo-Engraving equipment available soon. Write for information. Veterans ask about G.I. training. The Aurora School of Photo-Engraving, Tasope® Bldg., Aurora, Mo.

**HOME** Study course, drugless therapy. Free literature. Institute of Drugless Therapy, Tama, Iowa.

**MEDICAL** Laboratory technicians in great demand. We train you in your spare time, in your own home. You can practice while studying. Write for free catalogue. Imperial Technical Institute, Box 973-E, Austin, Texas.

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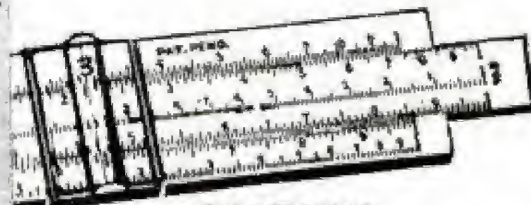
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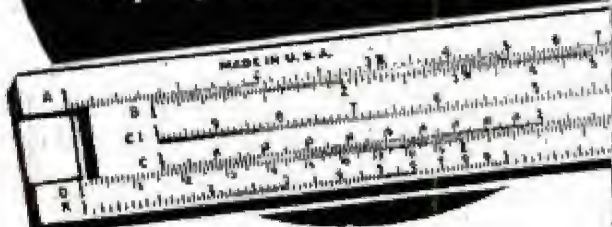
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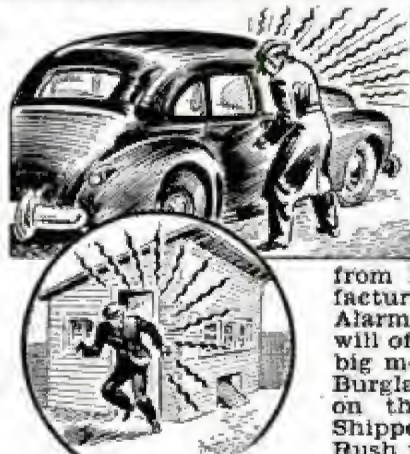
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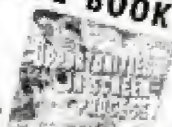
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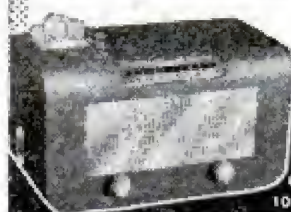
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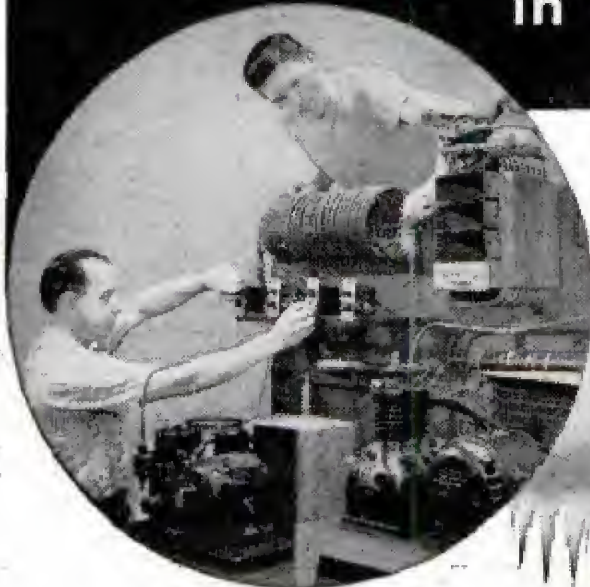
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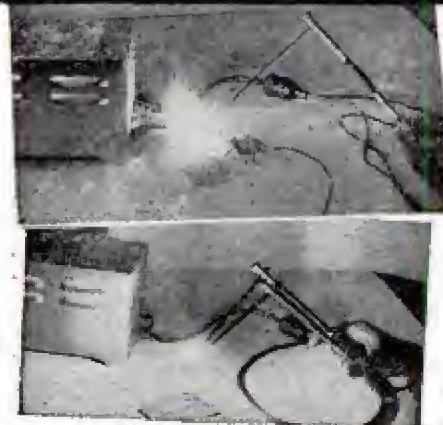
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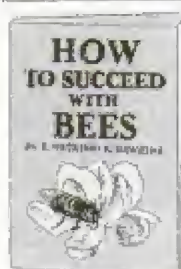
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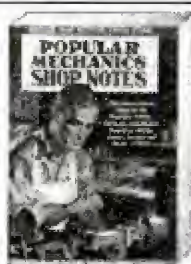
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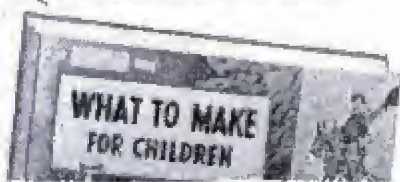


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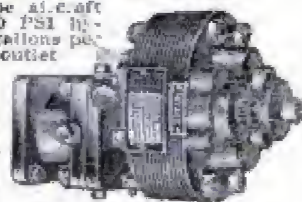
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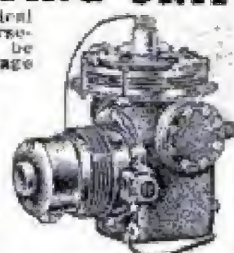
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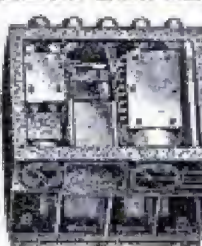
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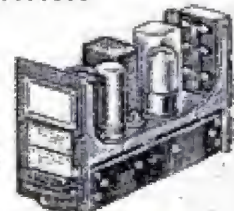
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Report No. 87496  
Jan. 5, 1948

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and quickly Wype can  
be applied, what a beau-  
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compares to a profes-  
sional spray job.

### Just 3 Easy Steps

1. Write a letter on the  
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2. Enclose with this let-  
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ing—not all—just one:

Either the sales check  
or receipt you got when  
purchasing Wype, or  
the powder puff you  
used to paint your car,  
or a reasonable facsimi-  
le of the Wype can.  
Send only one of the  
above with your letter,  
not all three. (When you  
order direct, we send  
official entry blank—  
our dealers also have  
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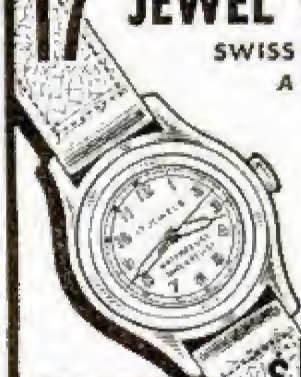
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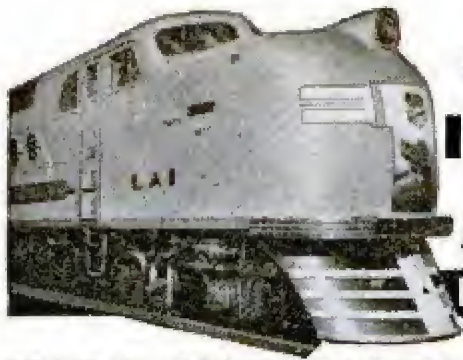
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- 2 lb. Whole Milk Powder
- 8 oz. Egg Powder
- 1 lb. Apricots
- 1 lb. Raisins
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- 2 lb. Sugar
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Extra heavy—extra long. Brand new, high quality gum rubber for softness and ease in use. Designed for heavy duty industrial service—protection in handling chemicals, acids, etc. A real bargain at this low price.  
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ARMY AIR CORPS TYPE  
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A519—27 Pieces.....\$7.95



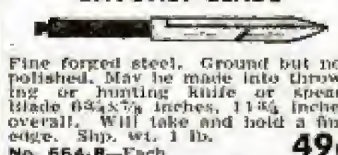
### McCLELLAN SADDLE



Brand new! Top grade cowhide, 12 inch seat. Hair girth. Has straps for blanket roll and knapsack. Gun boot and saddle loops. A real buy for any horseman. Weighs much more. Shipping weight 15 lbs. Stock No. A145. Each.....\$16.95

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Fine forged steel. Ground but not polished. May be made into throwing or hunting knife or spear. Blade 6 3/4 x 7/8 inches, 1 1/4 inches overall. Will take and hold a fine edge. Shp. wt. 1 lb.  
No. 664-R—Each.....49c



### RUBBER OVERBOARD SUIT



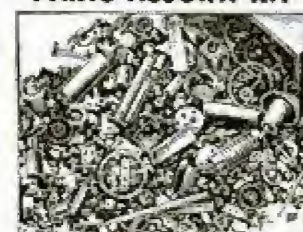
Here is a buy! Fits over your regular clothes and shoes. Can be cut apart for waist high waders, hip high or knee high boots, also arm length rubber gloves. Heavy gum rubber over fabric. Fine for those who work in the water, commercial fishermen, sewer diggers, etc. Use it as is or cut it up for waders. All brand new! Wgt. 14 lbs. No. 183, Each.....\$4.95  
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A130R—7 lbs. ....\$1.79

### AVIATOR'S OXYGEN OUTFITS

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Heavy canvas pouch. Ideal for toting lunches, shopping, books, etc. Has 11x12 inch pocket. Brand new, guaranteed perfect. Has oversize flap with single strap fastener.  
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### FLEXIBLE NECK FLASH LIGHT

Ideal trouble shooter's flash light. Flexible neck lets you direct light around corners and inaccessible spots. Brand new! Plastic case with BX type neck. Uses 2 standard flash light batteries (less batteries). Shp. wgt. 2 lbs. No. 205—Each.....\$1.39



### Officers Watch Compass

Brand new gov't. surplus. Army-Navy model. Single jewel mounted needle. Silver colored dial. A splendid value. Shp. wgt. 1 lb. No. A174—Each.....98c



### HIGH PRESSURE SHATTERPROOF TANKS

TYPE D2  
A high pressure shatterproof tank of 500 cubic inch capacity—for 50 pound pressure or 6.9 cubic feet. All metal—measures 6 1/2 x 24 inches. Threaded plug end vents. Shp. wgt. 6 lbs. No. 388—\$2.45  
Each.....



TYPE F1  
A high pressure shatterproof tank of 1000 cubic inch capacity—for 50 pound pressure or 13.8 cubic feet. All metal—measures 9 1/2 x 17 inches. Threaded plug end vents. Shp. wgt. 13 1/2 lbs. No. 389—\$3.75  
Each.....

### WILLARD 1 1/2 VOLT STORAGE BATTERY

A rechargeable, wet plate battery good for years of service. Brand new. Battery is shipped dry but fully charged—any battery station will add acid. Use singly or in multiples for radio sets, bell circuits, hand systems, etc. Measures 5 1/2 x 4 x 6 inches. Ball floats indicate proper level for filling. Shp. wgt. 4 lbs. Stock No. 297—Each, only.....\$2.95



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Winston-Salem, N. C.





# WE'RE RACING A POWER SHORTAGE

By Bill Reiche

AMERICA'S electric power systems, which kept the nation in high gear through 3½ years of unparalleled war production, might now reasonably assume peacetime should bring a breathing spell.

There should be time now to replace over-age equipment and generally to catch up with the parade of expansion and development which had been interrupted by World War II. Experts representing both private enterprise and government stated after VJ day that power demands would ease off and would not approach the national capacity of about 50 million kilowatts for several years.

Last November the Federal Power Commission pointed out how wrong the estimates had been:

"When war production in 1944 was keyed to its highest pitch, the demand for power reached 39.4 million kilowatts. To-day it has reached 46 million kilowatts, a 17-percent increase over the wartime high."

It was simply not reasonable to assume that any peacetime activity could embarrass the industry which had kept our mammoth economy "juiced up" through the most demanding war in history. And a classic job it had done. Yankee ingenuity and audacity enabled the power men to squeeze every last kilowatt from a groaning system.

Every old turbine and generator set in the country capable of turning out a few kilowatts was put back into service. The old water wheels at Niagara Falls, long since retired, were restored to service to aid Buffalo's booming war industries.

Steam plants were loaded above their

Top, symbol of the nation's race to provide power is this lofty tower for new 220,000-volt transmission line

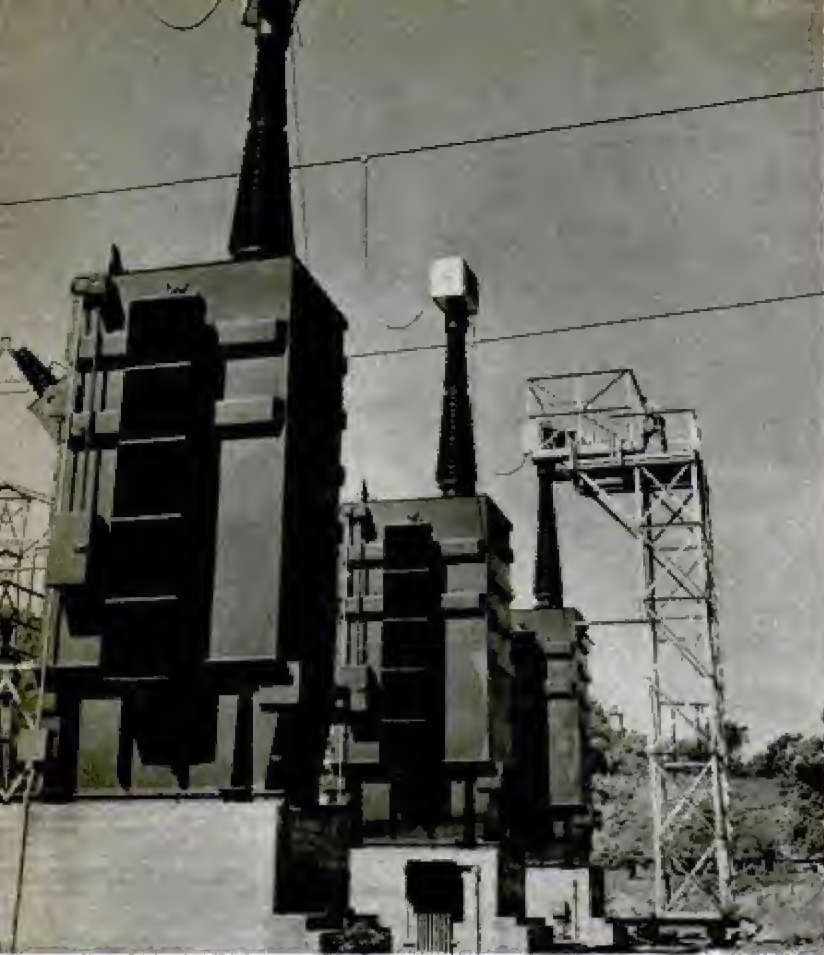
← Brush of fine wires detects leaks in gas-filled electric lines. Current grounds on the pipe at break



Pacific Gas and Electric Company photos

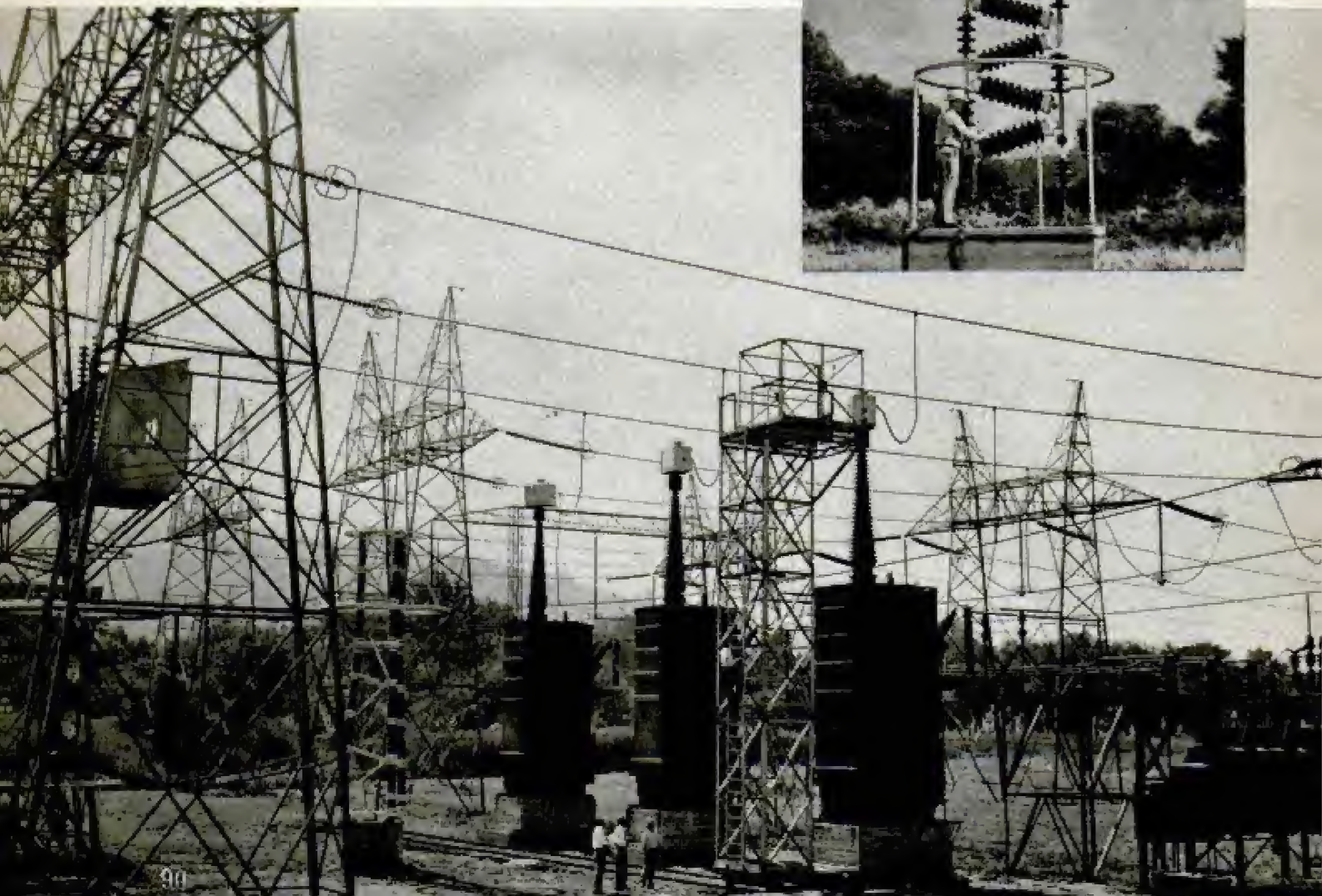
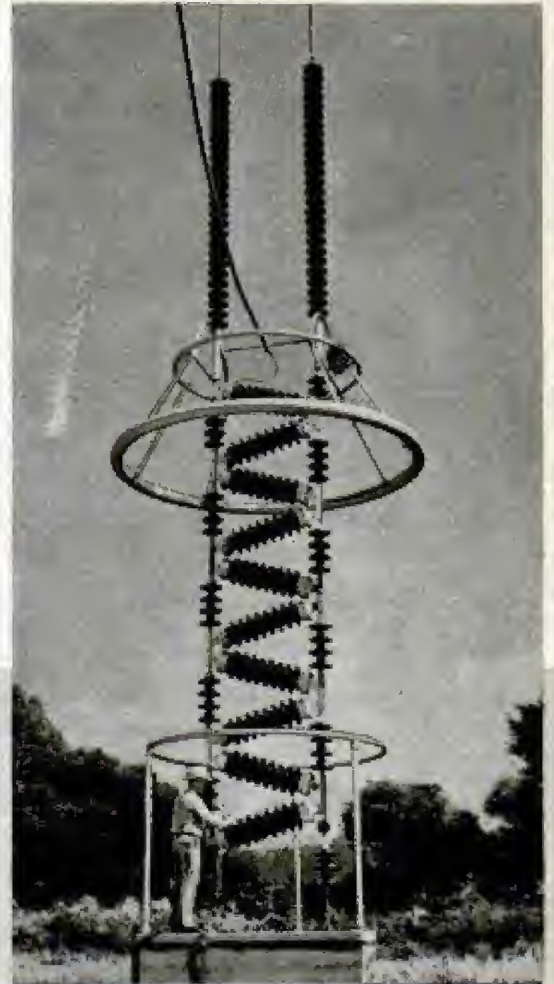






Westinghouse photos

At test station near Brilliant, Ohio, engineers use maze of new equipment shown below in effort to send greater blocks of power than ever attempted. Above, giant transformers will release 500,000-volt current. Above right, meters automatically record results. Right, arrester provides zigzag path for lightning





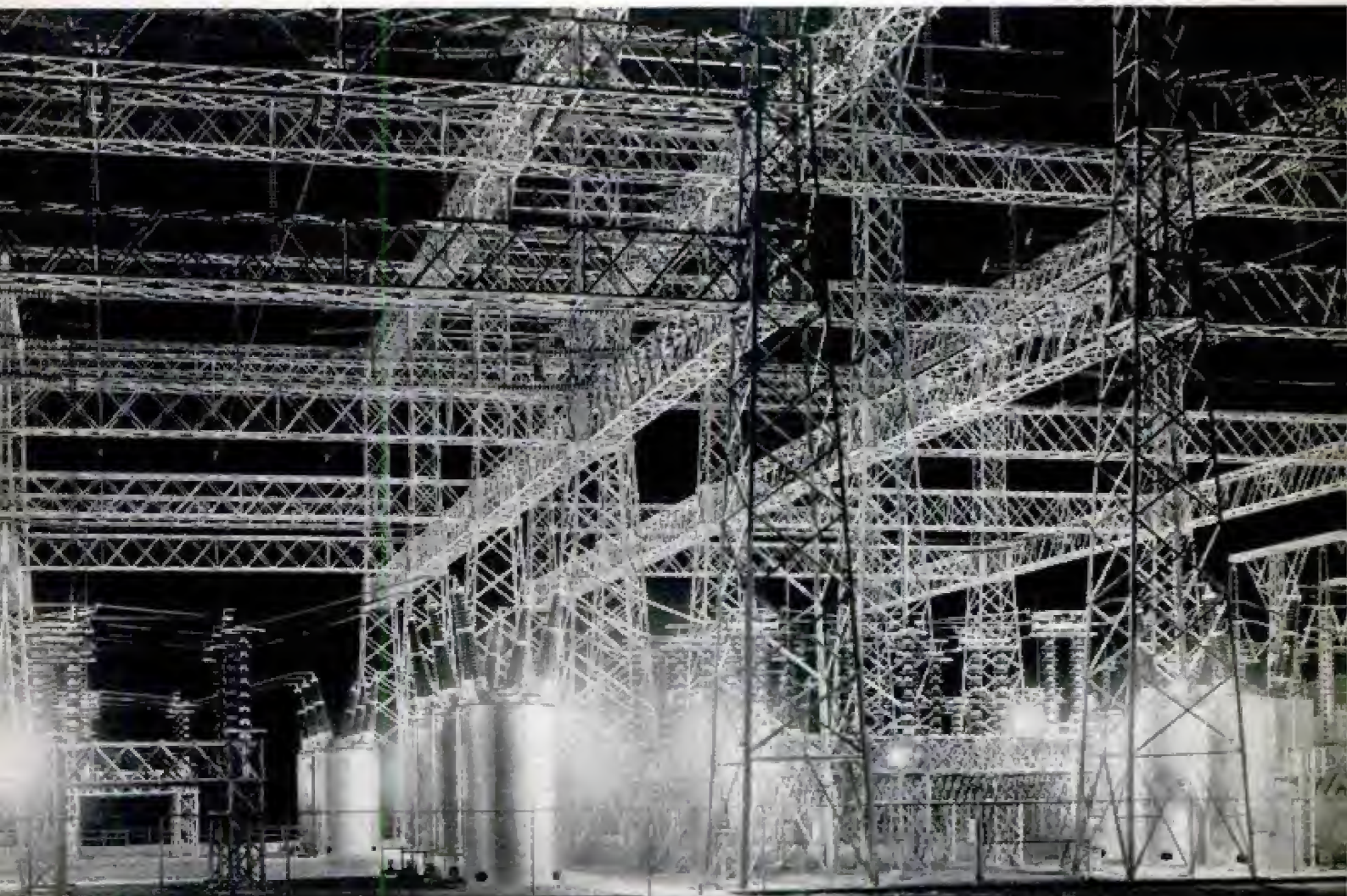
rated capacity until every normal 100-kilowatt capacity became 125 kilowatts. Insulation deteriorated at an abnormally rapid rate with the increased heat; transformer banks with a capacity of 50,000 kilovolt amperes were made to handle 60,000 and got so hot they had to be sprayed with water from hoses. Overloading such as this could, in two years, cut the life of equipment by 10 years.

The industry also made extensive use of a device designed to prevent the putting of all the electrical "eggs" in one basket—the power pool. Such pools are the joining, by inter-connections, of two or more adjacent systems for the purpose of transferring surplus power from one to the other. They are particularly useful in times of emergency or when one of the systems depends heavily on hydro-power and may encounter difficulties owing to drought.

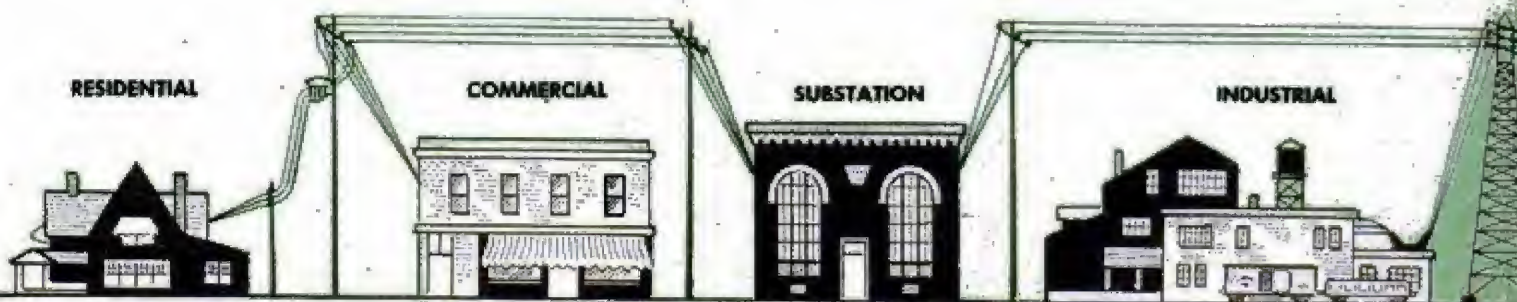
One of the largest power pools of the war years was formed in 1941 when the combination of a shortage of rainfall in the Tennessee Valley and rising power demands caused a serious shortage in Tennessee, Alabama and Georgia. Assistance was received from Virginia, the Carolinas, Pennsylvania, Illinois and other North Central States, Kentucky, Florida and the Southwest via Arkansas. As much as 42 million kilowatt hours a week—enough to light 420 million 100-watt lamps



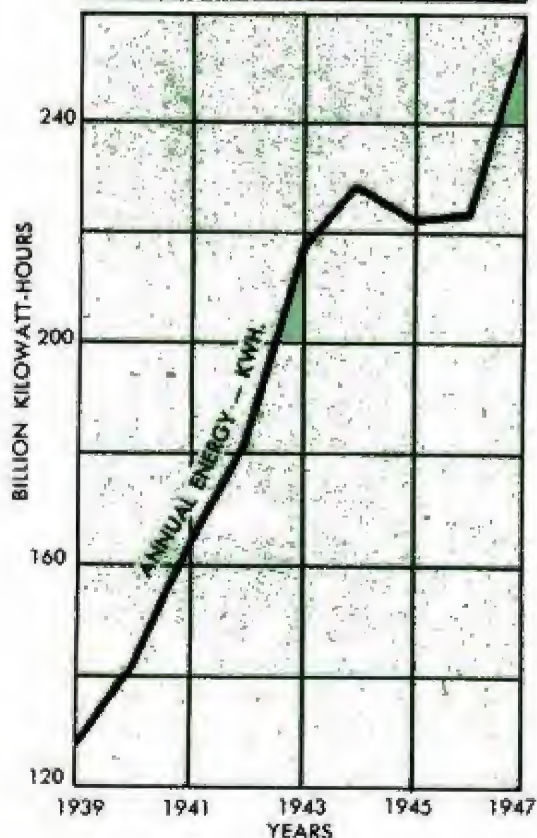
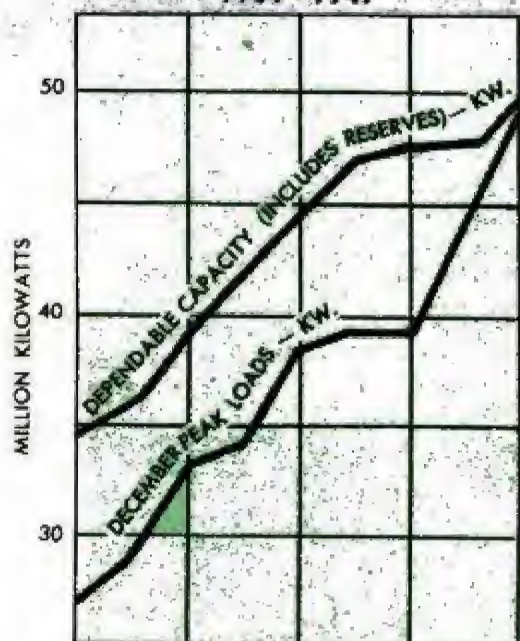
Big as a house, each 144,000-hp. generator at Grand Coulee turns water power into electricity. Boulder switching yard (below) is striking symbol of power







CHARTS SHOWING HOW U. S. ELECTRIC-POWER DEMAND HAS OVERTAKEN SUPPLY 1939-1947



for one hour—were brought into the distressed area.

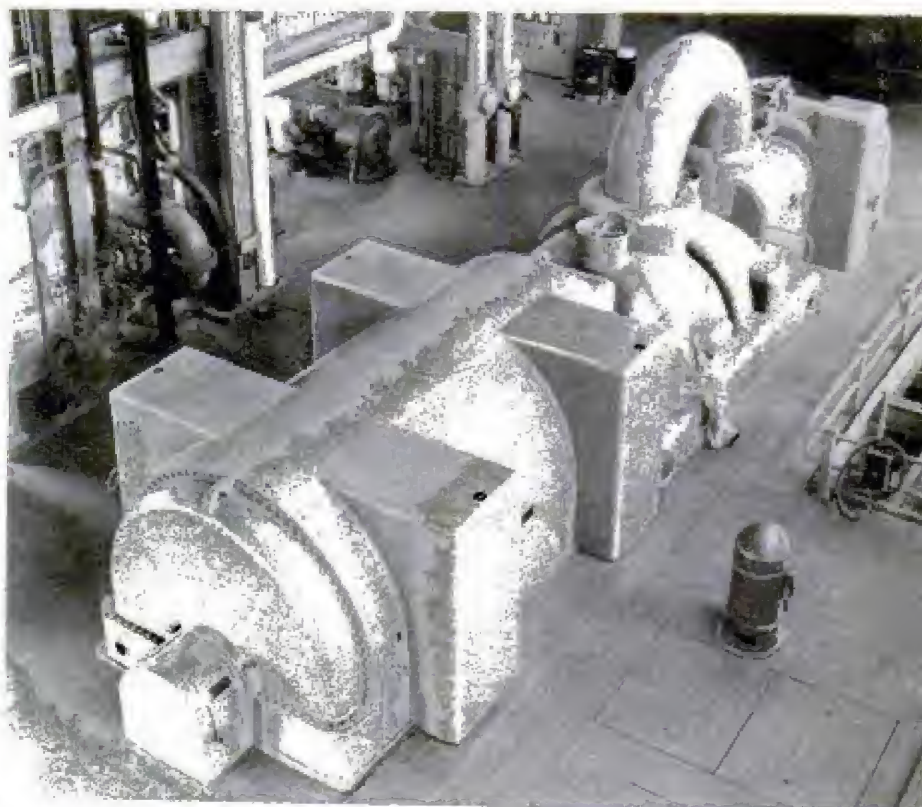
Power pools were used almost constantly during the emergency in many parts of the country. "Longest" of these was the Southwest Pool, which extended from Texas, through Louisiana, Arkansas, Oklahoma and Kansas, into Nebraska. In this pool, reserves were often as far as 500 miles from where they were needed and the power was shuttled from system to system.

Before going on with the 1948 power picture, it might be well to outline briefly how electricity is generated and transmitted to home and industry.

The two primary sources of electrical energy are fuel

← Top chart shows how peak loads are pushing dangerously close to capacity. Line on bottom graph shows increase in the power output

↓ Gleaming generator boosts power supply in western Pennsylvania





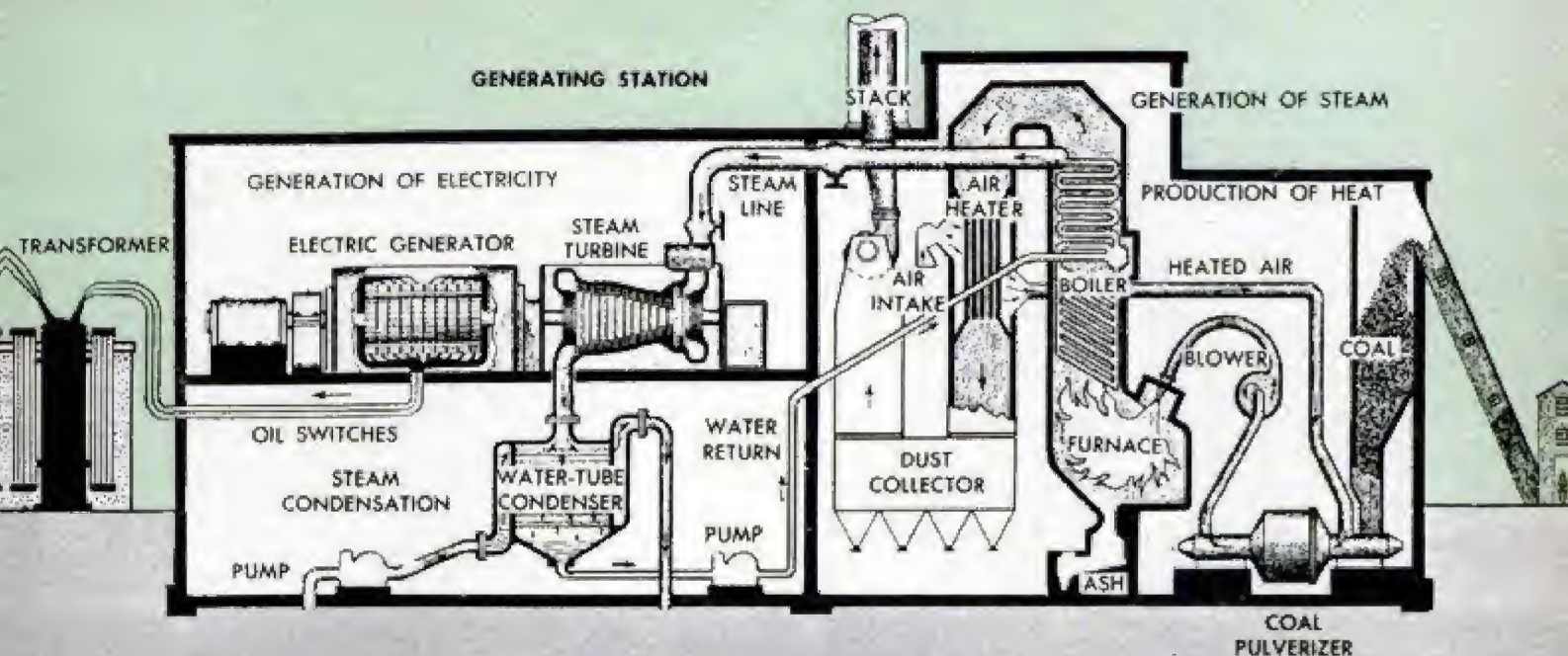


Diagram shows how a modern city is supplied with power. Coal which enters at right comes out as electricity

and water. About 65 percent of the nation's power comes from fuel, 35 percent from water. In the former category, roughly 77 percent was coal, 10 percent fuel oil and 13 percent natural gas during the first 10 months of 1947.

The fuel is burned beneath hundreds of tubes containing water, which is thus converted to steam. The steam is collected in a drum atop the boiler and is discharged through nozzles into the turbine, an en-

closed device resembling a windmill except that its blades are motivated by steam rather than air. The steam passes several sets of blades and proceeds to a condenser, where it is converted back to water and returned to the boiler. Through a common shaft the turbine drives the generator, which, in simplest terms, consists of a large electric magnet rotating inside a coil of heavy copper conductors.

(Continued to page 264)

Master control board at Chattanooga registers all power produced by TVA—some 14,000,000,000 kwh a year  
TVA photo







Street lights have to operate during all kinds of weather. A new model is tested for waterproofing under roof-top shower



## SHEDDING LIGHT ON LIGHTING

There's an untraveled, dead-end street in Cleveland that's one of the world's "Great White Ways." It is a street-lighting testing ground used by Westinghouse engineers. The miniature Times Square is only one branch of the laboratory. Inside tests are conducted in a building that has black walls, ceilings, floors and furniture to prevent light reflection. One exception is a shiny, white-walled room (above) that opens into two halves like a walnut shell. The walls consist of 20 flat sides giving it the name of "icosahedron." Its white interior provides perfect light reflection, according to the engineers. A small photocell on one wall measures light output of new designs.



Light intensity of new street lamps is tested (above) by means of big mirror shown at left. The mirror is moved around in a giant circle to reflect the light from the football-shaped lamp at right. The reflected light is measured with a photoelectric cell located about 25 feet away. An engineer controls the position of the mirror which enables him to make many readings without moving the light

Irregular-shaped "umbrella" attached to street-lighting unit is a plastic model of the way light beams from the lamp are reflected. Most rays are directed along the street providing maximum illumination of the pavement. This means fewer accidents for pedestrians and motorists





## Boatswain's Chair Aids C-99 Mechanic

To inspect and maintain the 57-foot-high tail of the Air Force's giant C-99, the builders borrowed a trick from seafaring men. They knew hydraulic stands couldn't be raised that high and few fields would have stands tall enough. Ingenious engineers at Consolidated-Vultee rigged up a boatswain's chair on the end of a block and tackle, hoisting it into place with a pulley built into the fin for that purpose. It will be a permanent part of the plane's inspection and maintenance facilities.

## Atom Clocker

Speeds of atomic particles can be clocked to one thousandth of a millionth of a second with a new electronic "stop watch." It also counts the particles and determines their energy in nuclear reactions. Developed at Yale University, the instrument is a combination of conventional vacuum tubes and standard electrical equipment. Its operation is based on

synchronizing electrical counters that detect a pulse in the circuit. The timing is done by measuring the delay inserted in the circuit to synchronize the counters.



Consolidated-Vultee Aircraft photo



## Button Maker

Buttons can be fabric-covered to match clothing with a kit that contains the button parts and necessary tools. A circle is cut from the desired fabric and placed in a holding tool together with the two metal parts of the button. Another tool is inserted and struck with a hammer to fold the excess fabric between the halves of the button and crimp the metal edges, forming a neat, covered button. The buttons require no special care and may be laundered. Parts for 12 buttons are provided in the kit, and refill packages are available.



# Here's the new crop of light cars



By Wayne Whittaker

**T**HIS is one automobile story that could be told without once mentioning the magic Motor City of Detroit. It is the story of a "minor league" revolt against the conservative full-size product that has made Detroit famous.

Some of the "leaders" of this revolution have such un-Detroit attributes as rear engines, three wheels, two cylinders, the ability to travel 50 miles on a gallon of



There's plenty of room for packages (top) under hood of Towne Shopper. It has 2-cyl. rear engine. Car goes 50 miles on gallon of gas





gasoline, and the starvation weight for at least one of only 600 pounds!

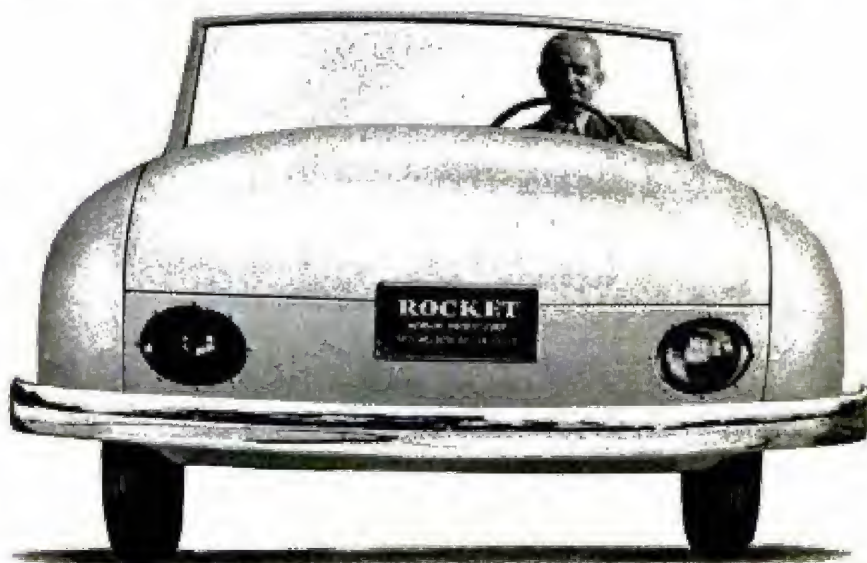
Let the curtain go up on a drama that may make U. S. automotive history. Take a bow, Cincinnati and Toledo, Ohio; San Diego, Van Nuys and Los Angeles, Calif.; Huntsville, Ala., and Buffalo, N. Y.

What's all the shouting about? Answer: A new crop of lightweight cars that will be pouring from assembly lines this year from coast to coast. Two veteran manufacturers of these cars (Crosley and Willys-Overland) are in production and at least five other newcomers to the field expect to be in mass production by the end of the summer. The Crosley output for 1947 (19,684 cars) and Jeep station wagon last year (33,307) are only drops in the bucket to the 400,000 small cars which optimistic manufacturers hope to build in 1948. Willys-Overland alone has production plans for 240,000 Jeeps. Some manufacturers predict that the figure for 1948 may be doubled next year, including cars built for export.

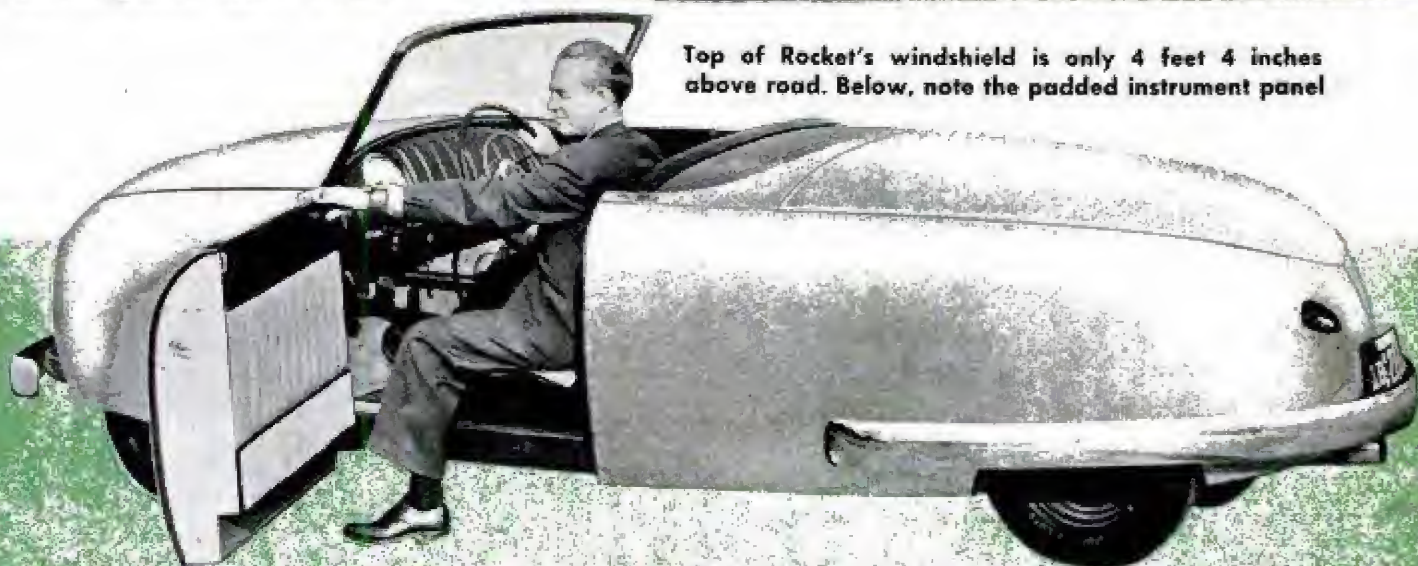
These light-car manufacturers are betting many millions of dollars that their plans will succeed. Bringing out a new car, however small, runs into figures that would



Radiator of the streamlined rear-engine Rocket is mounted alongside engine



Top of Rocket's windshield is only 4 feet 4 inches above road. Below, note the padded instrument panel







Crosley convertible is one of six '48 Crosley models

stagger any small-time operator. The little Towne Shopper, for instance, which will be built to sell for \$595, occupies a San Diego factory containing \$500,000 worth of tools and dies. The maker of another small car estimates his costs of getting into mass production at around \$15,000,000.

Light-car manufacturers are well aware of a long-time prejudice against small "foreign looking" cars on the part of the U. S. public; also the fact that Americans in general are supposed to like everything big. The manufacturers expect to beat down this prejudice — or



Powel Crosley, Jr., displays a new model sports utility car. Ideal for hunting or fishing trip, it holds two passengers and can carry 500 pounds of baggage. Below, another newcomer is smart all-steel Crosley station wagon with ample room for four passengers







Playboy convertible coupe features an all-steel disappearing top; the 51-inch seat holds three passengers

habit—with low prices, excellent mechanical performance, beauty of exterior and interior design, variety of models, comfort, maneuverability and economy of operation. In the past, they say, there was little choice in the type of light car a man could buy. Soon he will be able to take his pick from sedans, racy-looking sports cars, coupes, convertibles and sturdy station wagons such as the new Keller and the Crosley. Both of these station wagons will be built to sell for many hundreds of dollars less than standard cars of this type.

Rising costs of rent, food and gasoline are other major factors in the manufacturers' thinking. When a light-car owner tells his neighbor that he has just returned from a 1700-mile business trip with car expenses

totaling \$11, it inspires the neighbor to do some serious thinking—and comparing. (The trip referred to was made in a Crosley through Kentucky and Arkansas.)

Crosley Motors at Cincinnati is offering six 1948 models which consist of station wagon, sports utility, panel delivery, sedan, convertible and pickup truck. All are powered by the 59-pound Crosley Cobra four-cylinder engine of 26.5 horsepower. Top speed of the Crosley is about 60 miles an hour and gasoline consumption ranges from 36 to 50 miles per gallon, depending on speed and load.

The new Crosley station wagon is of all-steel construction and will accommodate four passengers or two passengers plus  $\frac{1}{4}$  ton of baggage or other cargo. It is

#### COMPARATIVE SMALL-CAR CHART

	CROSLEY*	DAVIS	JEEP* (Station Sedan)	KELLER* (Chief Convert.)	PLAYBOY	ROCKET	TOWNE SHOPPER
Engine	Valve-in-head, 4 cyl. 26.5 hp.	4 cyl. 60 hp. Hercules	6 cyl. 70 hp.	4 cyl. 25 hp. L-head	4 cyl. 40 hp. L-head Continental	4 cyl. 65 hp. or 6 cyl. 95 hp.	2 cyl. 10.6 hp.
Wheelbase	80 in.	106 in.	104 in.	92 in.	90 in.	106 in.	63 in.
Over-All Length	145 in.	180 in.	175 in.	160 in.	156 in.	161 in.	116 in.
Weight	1150 lbs.	1385 lbs.	2968 lbs.	1800 lbs.	1900 lbs.	2000 lbs.	600 lbs.
Top Speed	60 plus	116 m.p.h.	70 plus	60 plus	70 m.p.h.	75 with 4 cyl.; 95 with 6 cyl.	50 m.p.h.
Gasoline Consumption	36-50 m.p.g.	30-50 m.p.g.	25-30 m.p.g.	35.6 m.p.g.	30-35 m.p.g.	30 m.p.g. with 4 cyl.; 25 m.p.g. with 6 cyl.	45-50 m.p.g.
Tires	4.5x12	5.50x15	6.00x15	6.00x12	6.00x12	6.40x15	4.00x8
Price (F.O.B.)	\$799-\$929	\$995	\$1865	\$848	\$985	About \$1500	\$595

\*Specifications for only one model of Jeep and Keller are used in chart. Crosley figures are uniform for all models except price as is noted.





First Jeep with a six-cylinder engine is this deluxe station sedan; it has the interior finish of a conventional passenger car

designed for family use, business or farm hauling. The Crosley sports utility car, lowest priced in the line (\$799 F.O.B. Marion, Ind.) is a sporty two-passenger job handy for hunting, fishing and recreational trips. With its fabric top in place, the sports car has the same interior dimensions as the station wagon and provides about 45 cubic feet of space for 500 pounds of cargo. It can be converted into a four-passenger auto with the addition of a double rear seat. Another Crosley newcomer is the panel-type delivery truck designed for dry cleaners, grocers, druggists and other types of business where the merchandise handled is neither bulky nor excessively heavy. Sides and top of the two-door panel truck are of 20-gauge steel.

The Crosley company has big production plans for 1948 with a goal of 3000 cars and trucks a month. The number of dealers (now 700) is expected to be doubled by summer.

The Davis Motorcar Company in Van Nuys, Calif., has been exhibiting pilot models of its three-wheeled car in various cities about the country. This four-cylinder 60-horsepower car weighs 1385 pounds and travels 35 to 50 miles on a gallon of gasoline at speeds up to 116 miles an hour, according to the inventor, Gary Davis. This single-seat, teardrop-shaped car is 72 inches wide and seats four persons. Its Hercules engine is the only part not produced in southern Cali-

fornia. Initial production plans call for 50 cars a day and the company has hopes of boosting this figure to 1000 daily!

Willys-Overland at Toledo, Ohio, is hitting its stride this year with seven Jeep models in production, including a \$3500 fire engine, and an eighth model (sports phaeton) due to roll from its assembly lines next month. Some of the new Jeeps, particularly the station sedan, are a far cry from the old GI work horse. The station sedan (see comparative chart) and delivery car are moving out of the light-car class with weights only slightly under those of standard cars. However, wheelbase and over-all length are considerably less.

The Jeep station sedan has a new six-cylinder 70-horsepower engine which is

Production on this Jeepster sports phaeton will begin next month; its paint job will be fire-engine red





George Keller, light-car manufacturer, sits at wheel of a Keller Super Chief convertible. In this model a buyer is given a choice of front or rear engine; chassis is shown below with rear engine. Each wheel is independently suspended with rubber torsion springs; brakes are hydraulic



faster and more powerful than the regular 4-cylinder engine in the other models. The engine is L-head type with a 3-inch bore, a 3½-inch stroke and a displacement of 148.5 cubic inches.

Keller Motors at Huntsville, Ala., is getting into production at a converted war-time plant with a smart station wagon which will be followed later in the season with a convertible model. The Keller has an unusually substantial appearance for a lightweight car and has some outstanding mechanical features. All four wheels are independently suspended with rubber torsion springs; brakes of a standard design are fully hydraulic, and the 4-cylinder 25-horsepower engine can be placed either front or rear in the convertible. George D.

(Continued to page 256)

Gary Davis drives his new three-wheel teardrop-shaped Davis car 35 to 50 miles on gallon of gasoline







U. S. Navy photos

## Self-Driven Berth Simplifies Seaplane Moorings

Mooring of flying boats is simplified by the Navy's new self-propelled floating sea-plane berth. Even in the roughest seas, where maneuvering is a problem, it can be guided to the plane's side along a 600-foot submerged cable. Entry is further aided by water jets from six fire nozzles, pushing the craft from one side of the slip to the other. The berth is built of pontoons, with sides 125 feet long, spaced  $17\frac{1}{2}$  feet apart

at the narrowest point. They are joined below surface by horizontal and vertical trusses. Rows of partially inflated airplane tires on the slip's sides prevent damage to the plane in mooring. There are three propulsion units, one to pivot the slip and the other two to move it forward or back along the cable. It can be lowered and raised by pumping water in or out of the pontoon sections.



## Lightweight Trailer Holds Seven Canoes

Having to transport seven canoes many miles to a fishing camp in the woods, one sportsman built a special automobile trailer that would complete the move in one trip. Built of airplane tubing welded to form seven separate compartments, each designed to hold a canoe securely, the trailer is mounted on a pair of old automobile wheels. Lightweight, the loaded trailer is pulled along rough trails easily. Total cost of the unit was less than \$100.





## Plastic "Snow" for the Movies Made From Foam Blocks

"Snow," made in a machine resembling a large-scale meat grinder, keeps Hollywood ready for winter scenes on even the hottest days. The make-believe storm material is ground-up plastic foam block, a



Blocks of plastic foam are put through the grinder above to make snow for sets under hot studio lights

war surplus material used for buoyancy in aircraft and as insulation. The chaff photographs exactly like snow and can be made to simulate any kind of snow action. Gypsum and raw corn flakes were formerly used almost exclusively.



## Vibration of "Reed" Gauges Motor Speed

Matching motor vibrations with those of an adjustable steel "reed" measures the speed of a motor in revolutions per minute. A pocket-sized instrument, consisting of a spring-steel reed and a scale graduated in r.p.m. gives the motor speed without any connection to the revolving shaft. The instrument is held against the motor and the vibration frequency of the reed is varied by a thumb wheel until it matches that of the motor. The scale gives the motor's r.p.m.

## Reading Lamp Clips on Book

Weighing less than six ounces, a plastic reading lamp has a built-in clip that holds it to the cover of a book for direct, soft illumination that won't disturb others. The hooded shade directs the light on the pages only. A push-button switch glows in the dark.





# LIFE STORY IN PICTURES

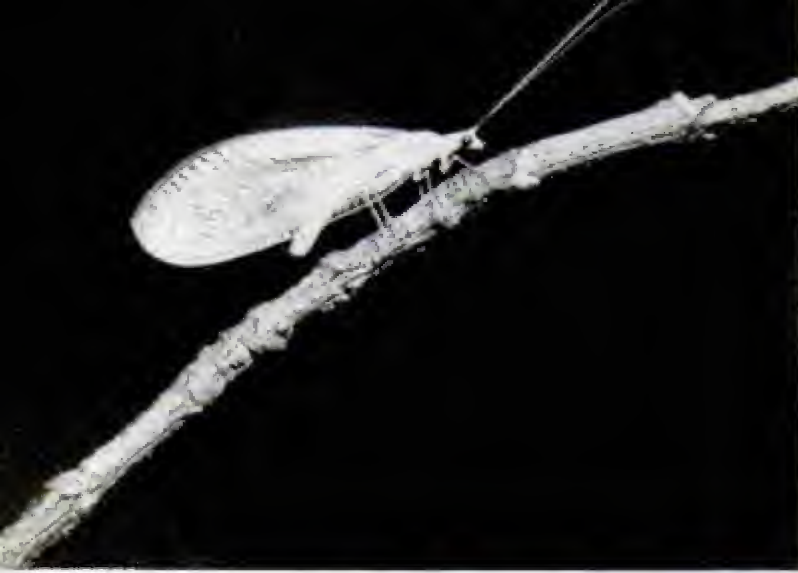
**R**ECORDING the life story of an insect in pictures is the photographic hobby of George A. Smith, supervising principal of a Quarryville, Pa., school. Four photographs are enough to tell the story because most insects pass through four distinct stages in their life cycle.

They start out as tiny eggs almost invisible to the eye. These eggs hatch crawling larvae. Then, after a period of feasting, the larvae settle down to the pupa stage in which they spin a cocoon and remain motionless for days. Finally, they emerge from the cocoon ready for adult careers.

Insect photography requires some special equipment. The camera should have an extra long extension bellows or a supplementary lens to bring the tiny insects up to recognizable size. A sturdy tripod is necessary to insure sharp negatives. The slightest jar means fuzzy pictures in close-up work. Photoflood or flash bulbs provide the light needed to permit stopping down the lens for depth of focus.

By watching the insect carefully during its life cycle, Smith is able to record the complete picture-biography in the four photographs. How does he keep his models still during the exposures? That's easy, he says. Insects are inactive and helpless when passing from one stage to another—so that's the time he goes to work and snaps his pictures.

↓ After eating, the larva forms a cocoon from which it emerges after 16 days as an adult lacewing fly

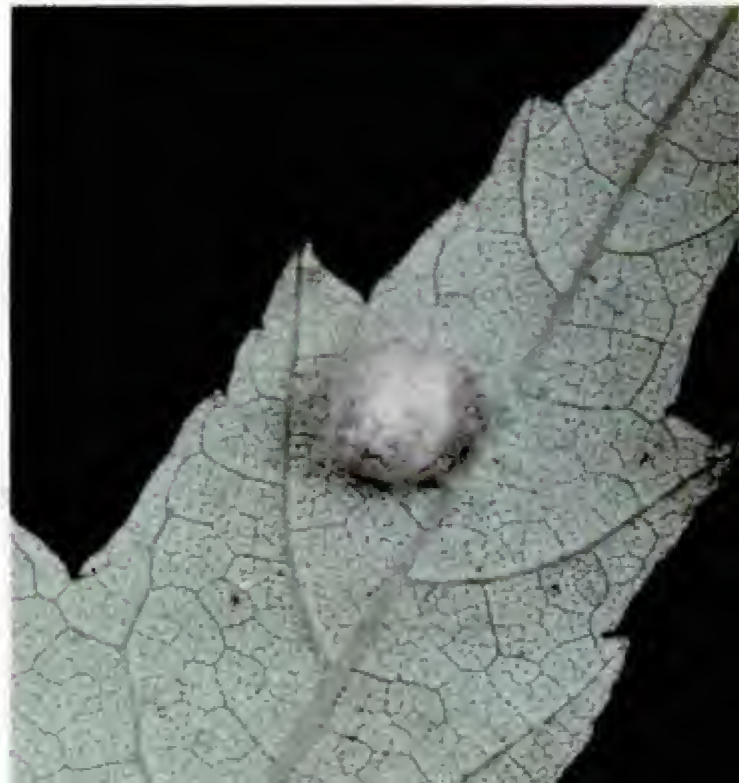


Still too weak to fly, this adult lacewing fly was photographed just after it emerged from its cocoon



↑ Eggs of the lacewing fly are laid on stiff stalks to prevent hatching larvae from eating other eggs

↓ Once hatched, the larva leaves its stalk and goes looking for food. Here it feeds on tiny plant lice





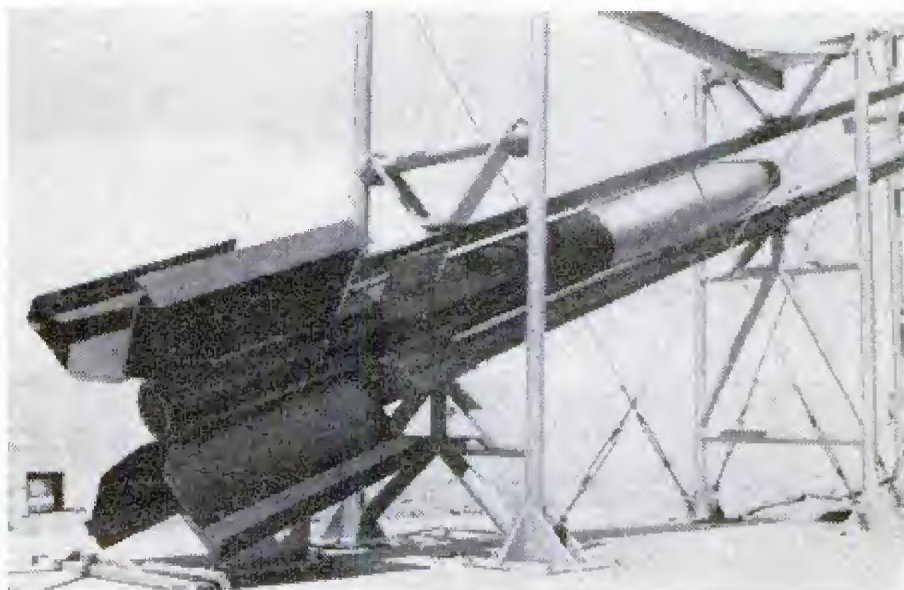


U. S. Navy photos

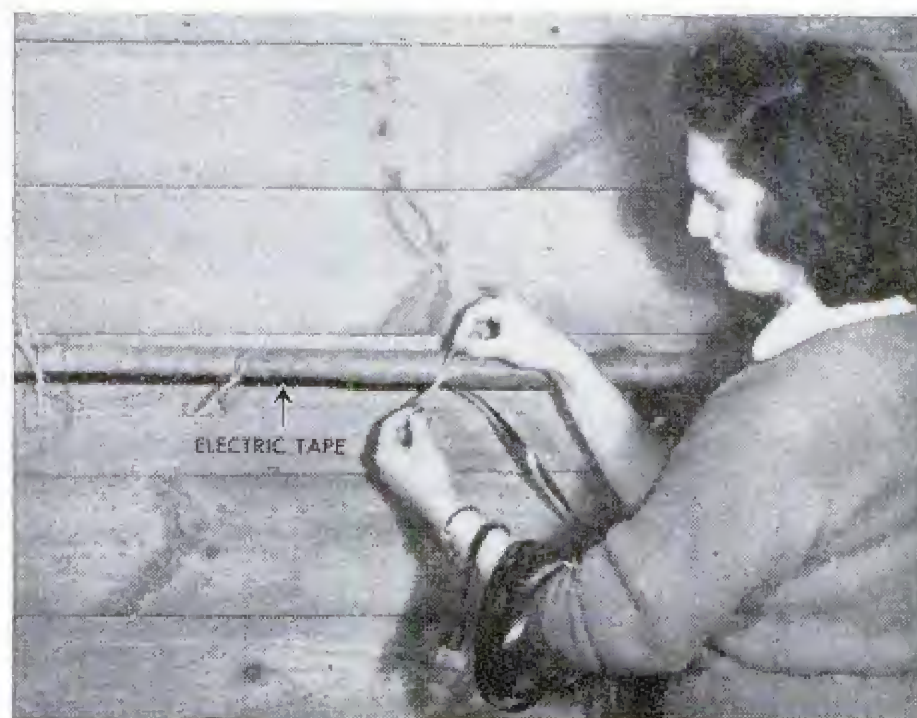
## Biggest Ramjet Faster Than Sound

About 25 times the pound-for-pound power of the best aircraft piston engines has been attained by the largest ramjet engine ever flown. Navy officials said it reached a speed "far into the supersonic range" in an initial flight at the Inyokern, Calif., naval-ordnance testing center. A duct open at both ends and with no moving parts, the "flying stovepipe" was developed by Johns Hopkins and associated universities and companies as a propulsion unit for the guided-missile program. Before it can operate efficiently, the engine has to be boosted to

World's largest supersonic ramjet leaves cradle at Navy testing base in a huge cloud of dust. It develops more power than a four-engine plane



supersonic speed by a rocket booster unit, which then drops away, leaving the ramjet to continue under its own power.



## Electric Tape Warms Pipes

Water pipes won't freeze at low temperatures when protected by an electric heating tape that can be used with or without an automatic thermostat. Available in 20 and 40-foot lengths, the tape is  $\frac{1}{2}$  inch wide and will prevent freezing in temperatures down to four degrees above zero, without insulation. With insulation, the freezing point is lowered considerably. The tape is tied to the pipe and plugged into a household outlet.





ANYONE experiencing a revival of the old desire to use sawdust and shavings in place of sand and gravel to get a lighter and cheaper concrete should get acquainted with the tiny diatom—nature's wonder plant—and how Walt Friberg used it to cut costs in his new home at Moscow, Idaho.

Walls, floors and roof of the house are made of this sawdust-and-shavings concrete. By teaming up wood waste and diatomaceous earth, every cubic inch of which contains millions of nature's microscopic wonder plants, Friberg cut in two the cost of these parts of his house and got superior insulation.

When he returned to the Agricultural Engineering faculty of the University of Idaho, Friberg, a veteran of the Army Engineers, found himself house-hunting.

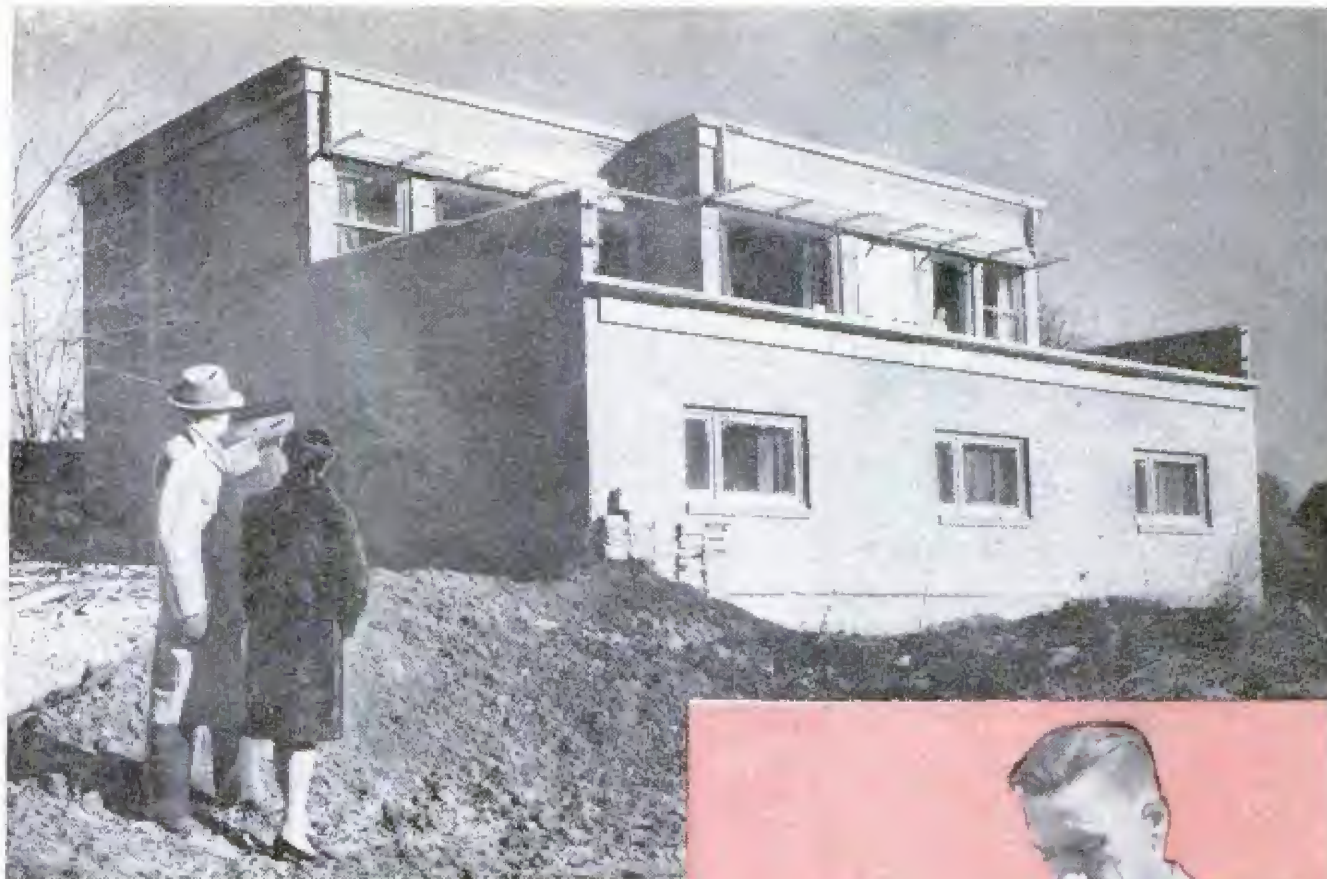
He saw sawdust and shavings being burned as waste by mills in his locality. Building a house out of wood waste was an old, old dream, he realized. Most engineers long ago gave up hope of getting a satisfactory wood-waste concrete. When the mix was lean, to take advantage of the cheap wood waste, the

## He built a home of sawdust-

Top, casting slabs for inside walls. Weighing a third as much as ordinary concrete, sawdust mix is easily pushed up ramp (below)







## concrete

The Fribergs (above) look over the rear of their new home. It was designed to conform to the slope of the hill. Right, some blocks were cemented in pairs to provide full wall thickness

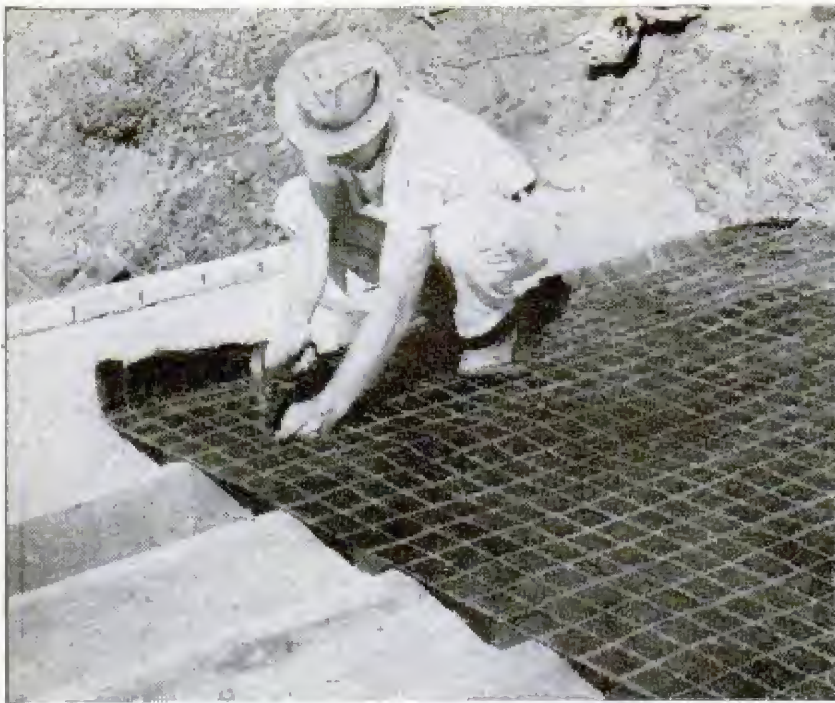


resulting concrete was not strong and would burn almost as rapidly as wood. When the mix was rich enough to be fireproof, the extra cement used wiped out much of the savings over sand and gravel and also destroyed much of the insulating value of the wood.

But during the war Friberg had learned something about the diatom that gave him courage to reopen the old question. Diatomaceous earth was used in industry as an insulator and fireproofing. He had seen how the magic material, added to the concrete mix in building giant reclamation dams in California, had greatly increased its workability. Perhaps diatomaceous earth would solve the sawdust-concrete problem. That hunch paid off and the diatom is in the building spotlight today.

Deposits of the diatom are widely distributed in the United States. Some of the





Reinforced wire mesh is nailed on joists before the floor is poured

largest deposits are in Oregon, California, Nevada and Washington. Because of its strategic value during the war there was an intensive search for new deposits. Many were found. While most of the new ones are too small or not of sufficient purity for manufacturing use, they are suitable for sawdust-and-shavings concrete.

In grandfather's day the diatom was just an interesting little plant to look at through a microscope. School-teachers impressed their pupils with the wonders of nature by holding up a small pinch of diatomaceous earth and telling them it contained thousands upon thousands of tiny shells.

Within the last decade, however, the diatom has vaulted to a

top place in industry. It is used in toothpaste, silver polish and nail polish; in purifying filters in sugar factories; as insulators in high-tension motors and electrical equipment, and as fillers in paint. Diatomaceous earth has over a hundred industrial uses, mostly in the chemical, food and pharmaceutical fields.

Friberg found that when a small part of the cement was replaced by some diatomaceous earth and a little common clay added, a low-cost, high-insulating, fire-resistant, lightweight concrete resulted. The cost, about half that of regular concrete, varies with localities, depending on the availability of wood waste and the distance from a deposit of diatomaceous earth.

Friberg's concrete cannot carry heavy loads. But since one inch of it has the insulating value of 12 to 14 inches of ordinary concrete, it is excellent for floors and walls where high insulation is desired and the load can be carried by a veneer of bricks or boards. Sawdust-concrete can be sawed, drilled and nailed just like wood and is amazingly fire-resistant.



Sawdust-concrete, though of coarse texture, spreads very easily. Here, workmen cover reinforced wire mesh with a thick coat of the mixture to form the solid floor slab





Here is the mix he used: 1 part of cement, 1 part of diatomaceous earth, 3 parts of sawdust, 3 parts of shavings and 1 part of clay—all volume measurements. Since sawdust-concrete has a higher absorption rate than straight concrete, Friberg added 1 part of clay to the mix.

First the clay is put into the concrete mixer. If it is lumpy, the clay should be soaked overnight before using. Next the diatomite is dumped in, then the cement. After these have been thoroughly mixed, the sawdust and shavings are added.

In his house, Friberg used mill-run sawdust that had aged about a year. In his experimenting, he found that new sawdust is not desirable. Neither is sawdust that has stood so long it is white. One year's aging, he says, is about right. With the shavings, age is not important. He used them green, aged a year, and older. They all worked well.

A mixture of pine, larch and fir sawdust and shavings was used in the house. Being run-of-the-mill, there was bark in the waste. Friberg found no objections to this, but he did discover that cedar and hardwood waste are not satisfactory.

No special equipment is necessary to put the diatom to work in home building. Friberg cast blocks and bricks in commercial

(Continued to page 280)



↑ Double-thickness blocks are laid inside the brick siding. The brick supports the main load of the building. The interior wall is given a plaster coat later

↓ Workmen say the sawdust-mix concrete handles much easier than normal mix. Here, they smooth out one-piece slab on the roof







## Powerful Wrecker Lifts Entire Truck Off Street

In Cincinnati, a city-owned wrecker clears almost any type of vehicle off the streets in case of breakdown. The 20-ton wrecker was designed by employees of the municipal garage and is capable of lifting or moving loaded trucks, streetcars and jackknifed trailers. Cables from two lift-

ing booms on the truck can be fastened to the rear end of the broken-down vehicle so that the entire vehicle can be lifted. Two cabs are mounted on the wrecker, one for driving and the other for the operation of the booms. The wrecker also is used for pulling down weakened walls at fires.

## Bees Turn Out Honey in Six Flavors, Each Appropriately Colored

Green-colored honey with the tang of mint leaves? That's just one of the six flavors of honey, each of them appropriately colored, produced at the Corning, Calif., apiary of E. C. Close. The beekeeper has applied for a patent on his process to produce flavored and colored honeys.

Through this process he manufactures honey in strawberry, pineapple, chocolate, lemon, maple and mint flavors. Close keeps his bees in electrically heated hives. He tricks the bees into turning out flavored honey by flavoring and coloring the syrup and pollen which he feeds them.



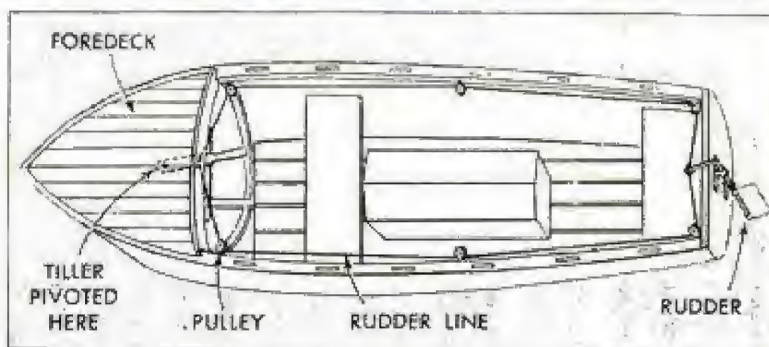
## Boat Pilot Faces Forward With Tiller Under Foredeck

Owners of small motor boats in the Puget Sound region use a simple tiller mounted under the foredeck for steering. This allows them to sit forward in the boat instead of at the stern, providing better balance. The wooden tiller is pivoted at the front end and may be swung to the left or right to steer the boat. Rudder lines from the tiller are carried aft through pulleys attached along the gunwales inside the hull.

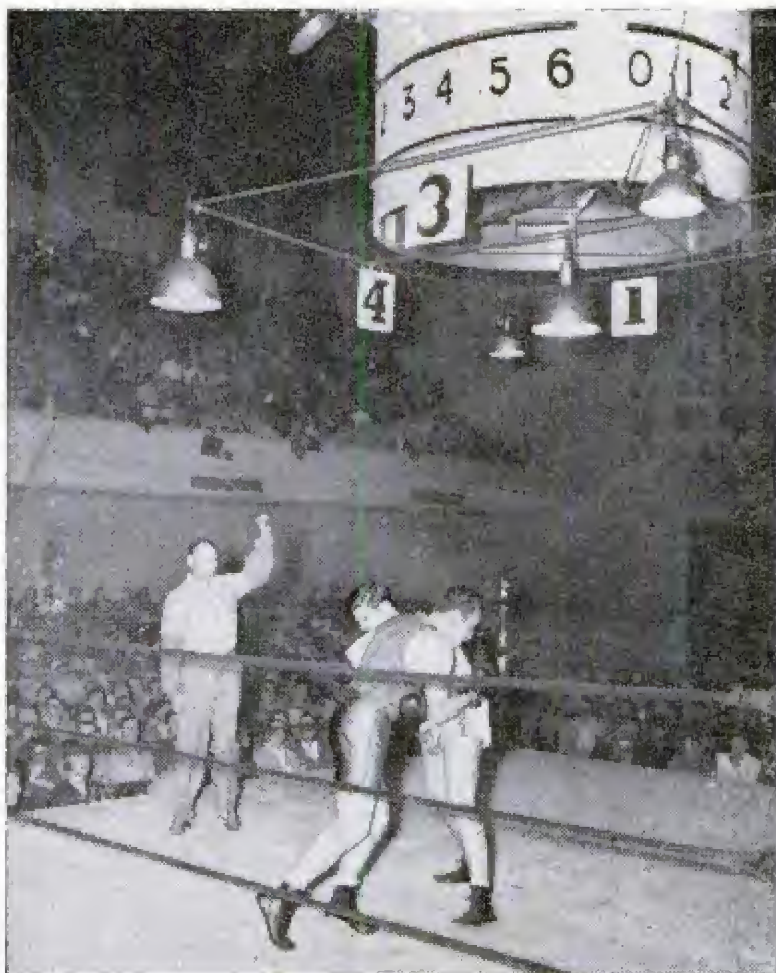


## Coffee for Cattle

Waste pulp from coffee beans is a good substitute for corn in the feeding of cattle, according to technicians of the United States and El Salvador. Tests with the coffee pulp prove that pound for pound it is the equal of corn in milk production. The discovery may be important to the economy of coffee-producing countries, where the fleshy covering of the coffee bean is a waste product that presents a disposal problem. Tests show that the digestibility of dried coffee pulp is about the same as that of corn, although it is less



palatable. The pulp is mixed with dried banana leaves or molasses to make it more appealing to the cow. Additional tests are planned, using the pulp as poultry feed.



## "Ref's" Sleeve Covers Serve as Signals

Since aggressiveness is an important factor in deciding fight winners, a San Jose, Calif., boxing promoter offers a way to keep fans informed while the bouts are in progress. The referee wears specially colored sleeve covers and raises a corresponding arm when one or the other of the boxers is on the aggressive. A huge timer above the ring records the time of each boxer's aggressiveness.

## Quick-Freezing Dried Foods Preserves Natural Flavor

Fruits and vegetables are preserved through a new technique called dehydrofreezing. The process combines the advantages of dehydration with those of quick freezing, removing much of the moisture before the food is frozen to reduce weight and bulk. This creates a saving in packaging, storage and transportation. Food value is virtually undamaged.





## ELECTRIC BLACKBOARD

Instructors can present their material visually with the aid of an electric blackboard, which projects the actual process of writing or drawing upon a large screen. The instructor sits at a desk facing the audience. Any transparency in the form of a photograph, kodachrome, drawing, sketch, map or business form can be slipped into the machine's frame beneath a continuous sheet of transparent material



Left, when operator draws, lines appear on screen. Above, lens picks up the transparency for projection

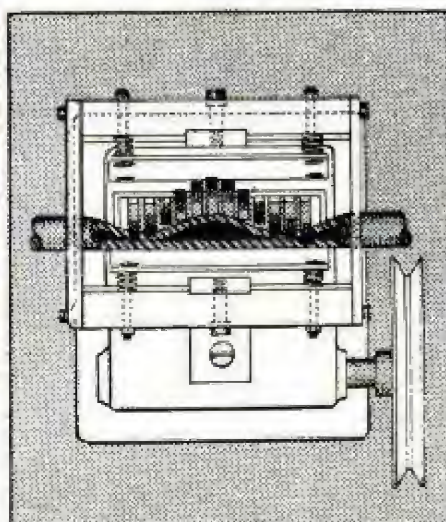
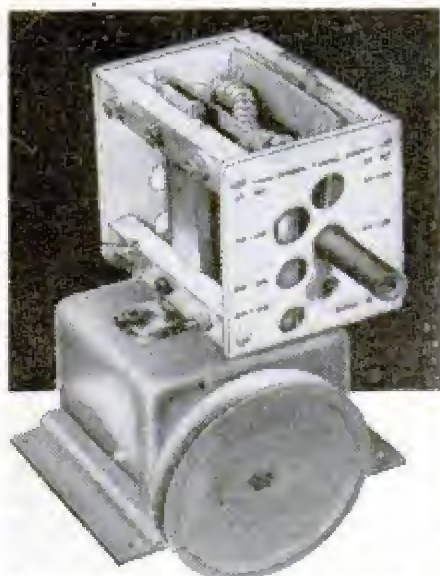
that provides a writing surface. Light is projected upward through the transparency to an overhead lens, which focuses the image on a mirror. From there it is reflected to the overhead screen. The instructor may write on the 8 by 10-inch transparent surface of the lower projection case with a grease pencil and the lines will appear on the screen. The projector with screen and tripod weighs 30 pounds.

## Metal Fingers "Pump" Liquid Through Tube in Waves

Without touching the material being pumped, an unusual pumping device moves liquid or gas through flexible tub-

ing in a wavelike manner. The tubing is inserted in the machine and metal fingers press against it in rapid succession forcing

the material through with a pulsing motion. As it is forced along, additional material enters the tubing to be moved forward in the next pulsation. Because there are no valves, pistons or metal parts in contact with the material, the device can be used for pumping corrosive liquids and gases, and liquids containing solids without damage to the machine or separation of the materials. The volume pumped is varied by changing the size of the tubing used or by using more tubes.



Left, rubber tube that carries liquid runs through the pumping device. Right, "fingers" pinch tube in rapid succession forcing liquid forward



## Liveliest Golf Ball

Golfers are promised improved distance this summer from a silicone-center ball wound by a new method. Derived from sand, the "bouncing putty" has more resilience than anything previously used. The center is the size of a large pea. It will be wrapped with about 30 yards of rubber thread by an electronic winder that insures uniform tension in the manufacture of all balls. The winder consists of a photoelectric tube wired to a system of relays and amplifiers. A narrow beam of light shines through a lens onto the tube. In its path is the golf-ball thread, vibrating like the string of a violin. When the vibrating thread crosses the beam it sends light impulses to the phototube, which is adjusted to take them at a preset, uniform frequency. When they come too fast or too slowly, an electronic brake puts more or less pressure on the thread, bringing it back into "tune." The checking and adjusting automatically take place in a fraction of a second.



United States Rubber Co. photo

## Plastic Flooring Similar to Linoleum Resists Chemicals

Floor covering similar to linoleum is made of plastic and requires no waxing. Produced in roll form six feet wide, it is more flexible than linoleum, nonporous and resistant to chemical action. The material is Vinylite plastic, laminated to a felt back with the design running through

the entire thickness of the plastic. It is laid in the same manner as linoleum. A wall covering made of plastic, which also resists chemical action, is available in the same colors and patterns as the floor covering. It can be bent at sharp angles without showing surface cracks.



## Lock-On Hub Cap

Automobile hub caps that lock in place cannot be stolen, and protect the wheel from theft. A decorative emblem conceals the lock. When this is removed, the key can be inserted and the hub cap taken off. The cap, made of stainless steel, can be installed with a tire wrench without altering the wheel. The accessory is available for three makes of cars, and production of other models is planned.

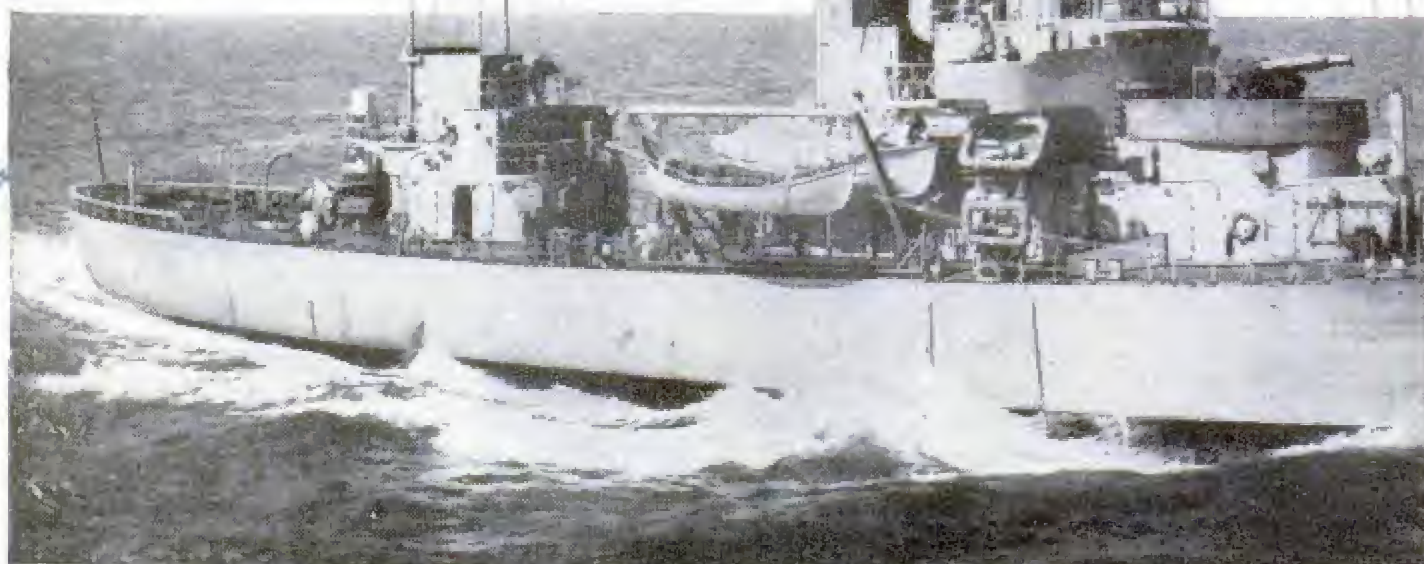
If you would like additional information concerning products described in this issue, including names and addresses of manufacturers, just write to the Bureau of Information, Popular Mechanics, 200 E. Ontario St., Chicago 11

*Letter returned left as address*





Chart shows currents which propel icebergs from Greenland into the shipping paths. Below, Coast Guard cutter Mendota has cruising range of 10,805 miles at 11 knots. Its motor is turbine-electric







Coast Guard photos

Eroded by wind and sea, this iceberg off Greenland coast has odd shape. Coast Guard takes a close look

# ICEBERG HUNT

By Comdr. G. H. Bowerman, USCG

*Commanding Officer,  
Coast Guard Cutter Mendota*

THIS is the story of the U. S. Coast Guard cutter Mendota and her 11 officers and 108 men who sail on the International Ice Patrol. Our job is to round up maverick icebergs that menace shipping in the North Atlantic.

After the disaster of the Titanic in 1912, 14 maritime nations organized the International Ice Patrol and entrusted its operation to the Coast Guard. Regularly from 1914 to 1941 its vessels patrolled the shipping lanes. Not a single life was lost in an iceberg collision during those 27 years. When World War II came, the Coast Guard abandoned the patrol. Then on March 20, 1943, a merchant vessel struck an iceberg in the fog and there was heavy loss of life. On March 27, 1945, several ships in convoy were damaged when two of them rammed a huge berg.

These tragedies were proof enough of the patrol's value and it was promptly resumed in the spring of 1946. Coast Guard vessels now patrol an area east of Newfoundland as large as the state of Pennsylvania each year from March to July.







Through it passes the world's heaviest sea-borne traffic. Here is the account of our cruise last year:

**May 14**—The Mendota sailed from the port of Argentia, Newfoundland—headquarters of the International Ice Patrol Commander. The snow was falling in squalls and the fog was thick.

**May 15**—As the Mendota cruised toward its search area, latitude 44 degrees north, officers and men who had never been on ice patrol before were briefed by the old-timers.

Just what are icebergs? Ice masses, often as long as a city block and weighing thousands of tons. They break off from glaciers along Greenland's western coast and drift south. An average of 428 drift down each year, ranging from a low of eight or ten in 1924 to a high of 1350 in 1929.

How fast do they travel? About 10 miles a day on the average. Some have been known to drift 30 or 40 miles a day for a week. Ocean currents move icebergs. Wind influence is negligible. About 85 percent of the berg is below the water.

Most of the bergs found in the North Atlantic are in the area off the Grand Banks near Newfoundland.

**May 16**—A radio message from the SS Lucy Stone, out of San Francisco, requested medical aid for a seaman with a badly infected finger. The two vessels altered courses and effected a rendezvous about 5 p.m. One of the Mendota's boats transferred the injured man and when brought aboard he responded to penicillin treatment.

**May 31**—Iceberg seasons have a cycle of seven years and this year was the lightest in the cycle. The Mendota patrolled for more than two weeks without sighting a single berg. On this date, how-

Top, Cutter Storis is trapped by icebergs in Greenland waters. Middle, a small boat lands blasting party on berg. Bottom, explosives throw up a 200-foot fountain and clear a path





Beneath motors of B-24 patrol plane, a Coast Guard cutter circles an immense iceberg in the North Atlantic. Teamwork between aircraft and ships of the International Ice Patrol speeds charting of iceberg movements

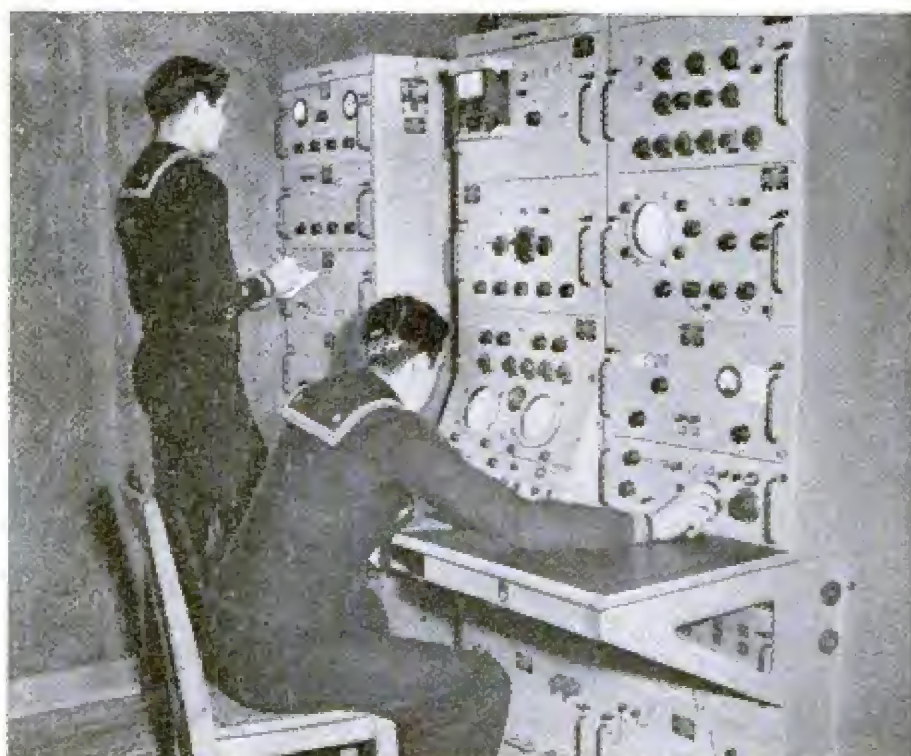
ever, the first one was spotted at 6:41 p.m.

Word spread quickly throughout the ship and all hands who could leave their stations found a place topside. From a distance it appeared to be a white line on the horizon. As the cutter approached, delicate blues and greens of hard glacial ice could be seen. In size and shape it resembled an aircraft carrier. It was flat on top with vertical clifflike sides rising 30 feet above the water. Its length was estimated at 750 feet and its width 200 feet. Around it were growlers and bits of recently undermined ice. Veterans of the patrol estimated its "depth" at about 210 feet.

Information on the berg's position and size was radioed to Argentina. Soon this information crackled through the air from the powerful Argentinia radio sta-

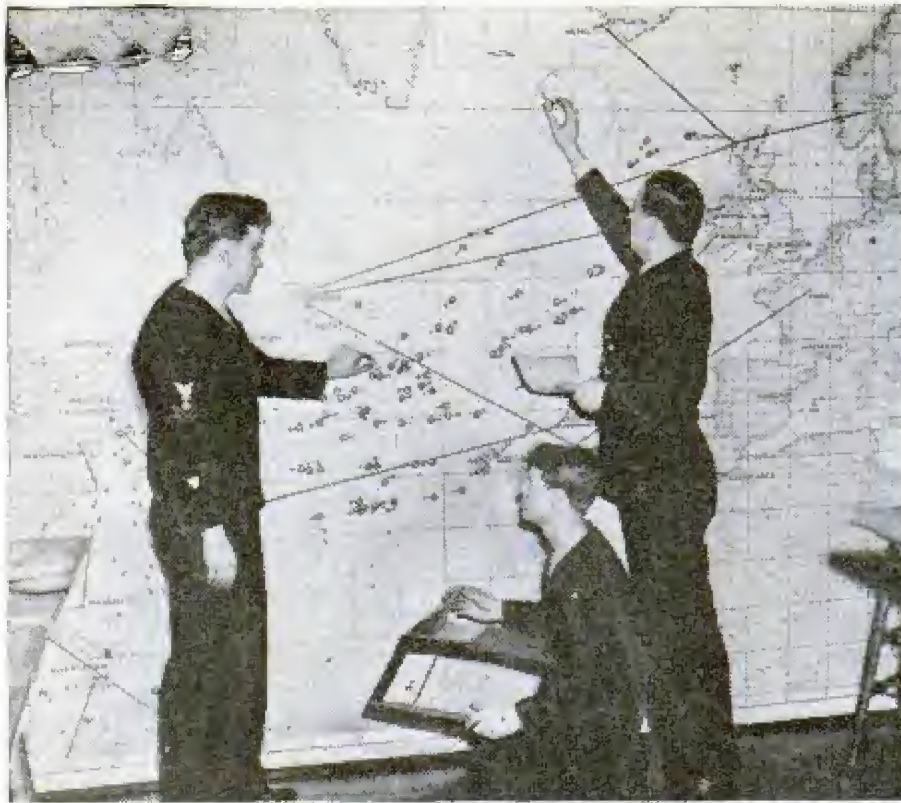
tion to all ships in the North Atlantic. The Mendota then settled down to drift with the berg for 24 hours to measure its speed and direction.

**June 1**—The Mendota spotted its second berg. This one, instead of being flat and square, was canted on one side and its



Plotting position of icebergs at a new loran timing station





Iceberg and ship positions are all plotted on this board at headquarters

peak rose 70 feet into the air. As it melted, it gave off a cracking sound and huge pieces of ice sloughed off into the sea.

Radar and loran are now being used to insure better detection and location of icebergs. However, a vigilant patrol by cutters and planes is essential.

Both radar and loran are most useful in

Twice on this date four-motored Coast-Guard manned B-24s have roared overhead and pilots have dipped their huge wings in greeting. These patrol planes are based at Argentia and represent another refinement in the search for icebergs that are drifting in shipping lanes.

(Continued to page 284)

This is the Ice Patrol's version of spring plowing as a cutter heads into crust of a North Atlantic ice pack



foggy weather. Large and medium-sized bergs are picked out easily on the radar scope. Some night experiments have also been made with underwater sound gear and bergs 2000 feet away have been located.

This ship is a single-screw, turbine-electric vessel, 254 feet long with a 43-foot beam. It has a cruising range of 10,850 nautical miles at 11 knots or 5750 nautical miles at 17 knots.

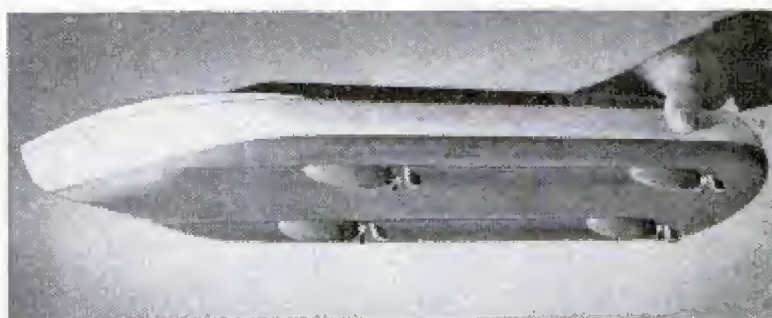
**June 10**—The *Mendota* was ordered to search for a large berg drifting in shipping lanes 1300 miles due east of New York City. This elusive berg, nicknamed Dumbo, was reported by the SS *Esso Glasgow* to be 50 feet high and 200 feet long.



## "Package" Engines on Ocean Ships May Be Attached Outside Hull

Ocean-going ships may have their engines mounted in streamlined gondolas attached outside the hull instead of in the hold, according to William Costa of San Diego, Calif. Costa has invented a system of "packaged power" in which marine engines are complete units that can be attached to the hull. He has built a model of a liner to be powered by four 1200-horsepower Diesel engines affixed in tandem to a 165-foot hull. Twin grooves that run the length of the vessel will stabilize the craft at speeds in excess of 30 knots by creating a vacuum along the bottom of the hull. Advantages of the power system include a greater payload capacity when engines are removed from the hold, greater adaptability and ease of maintenance, according to Costa. A faulty engine could be removed and an entire new unit installed within 24 hours.

Top, Costa built model of liner to show streamlined design. Right, "package" engines in gondolas will be attached to hull



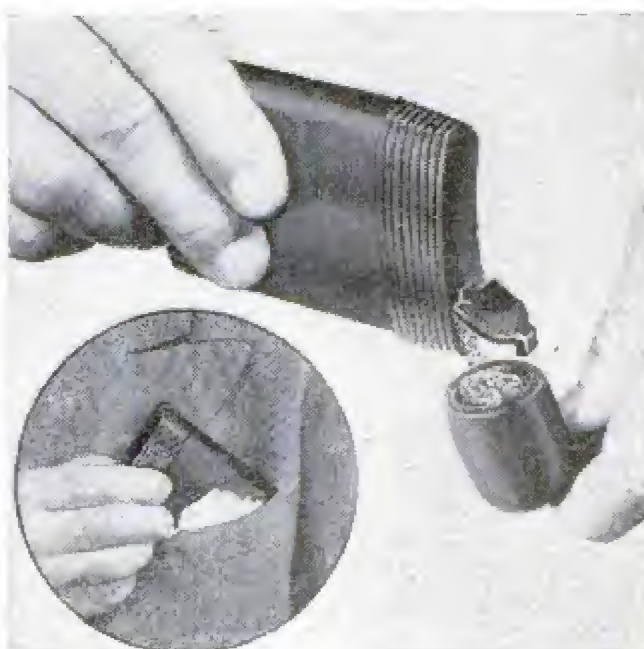
## Saw Replacement Handle

Replacement handles that fit any conventional saw can be installed by drilling only one hole in the blade. A key fastens to the hole and slips into the handle. A single screw is threaded into this key to hold the blade rigid. The wedging action of the rear edge of the saw blade against the handle prevents any play. Some saws must be cut at the proper angle to fit into the slot.

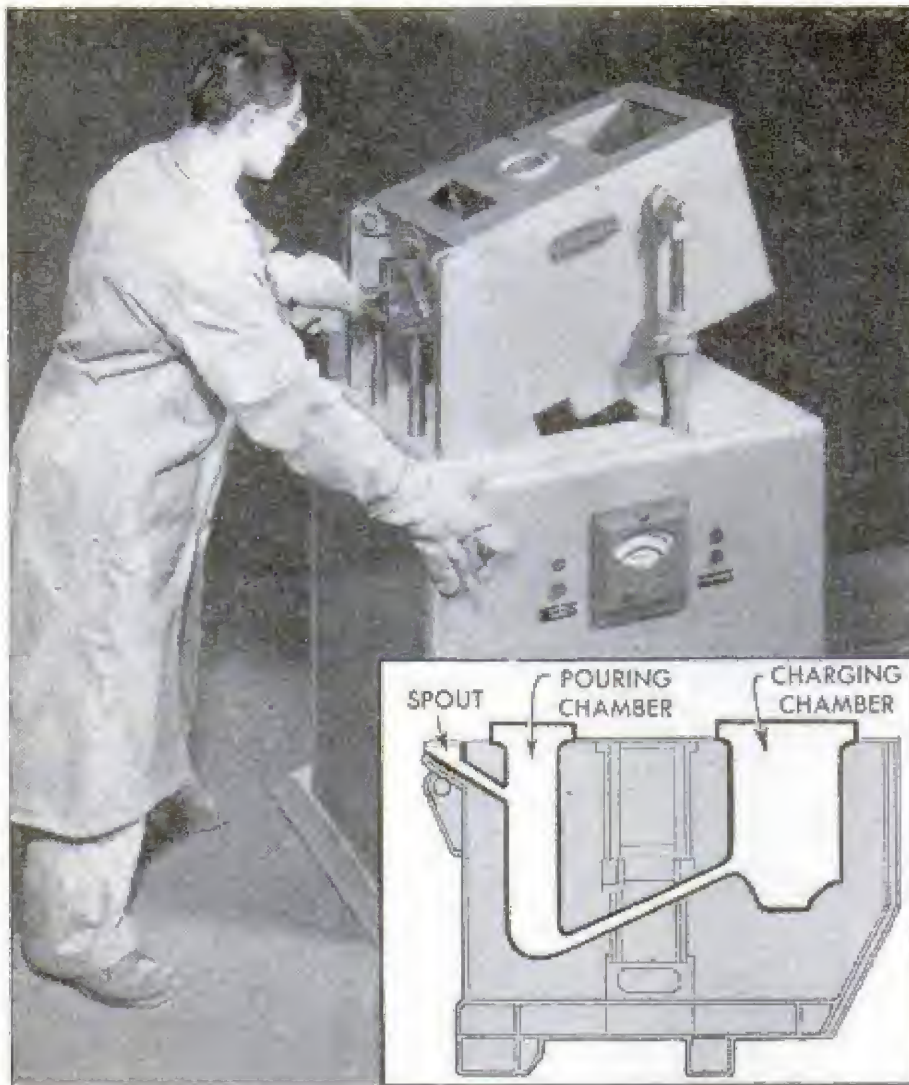


## Vest-Pocket Humidor

Two days' supply of pipe tobacco keeps fresh in a flask-type humidor curved to fit small pockets without excess bulging. A spout with a flip-up cover facilitates pipe filling. Made of two-tone rigid plastic, it is 2½ inches wide and 3¾ inches high. To service the humidor unit built into the top section, the felt insert is removed and dipped in water, then squeezed out and replaced.







## Continuous Casting With Double Furnace

Molten metal is always ready to pour with a two-chamber melting furnace that raises and lowers hydraulically. Cold metal added to the charging chamber does not affect the temperature of the pouring metal, thus pouring can be continuous. In addition, impurities in the metal remain in the charging chamber so that metal poured from the second chamber is always clean.

## Birds Glow in Dark

Some birds glow in the dark with a phosphorescent light, just like certain fish and other sea life. Dr. W. L. McAtee of the U. S. Fish and Wildlife Service thinks the light comes from luminous bacteria or fungi eaten by birds, like the barn owl, or attached to their tissues.

## Electric Sharpener Can't Damage Knife

Too much pressure automatically stops a motor-driven electric knife sharpener and prevents blade gouging. Only the edge of the blade is sharpened. If more than the edge is held against the wheel, the motor stops. Two stainless-steel guides position the cutting edges against the abrasive wheel and both sides of the blade are sharpened at the same angle. A pressure panel switch starts and stops the motor.



## Chemical Smoke May Turn Back Radar in the Future

Chemical smoke that can stop radio waves, thus limiting the usefulness of radar, has been predicted by Col. M. E. Barker, commandant of the U. S. Chemical Corps School. He suggests that radar beams, which have made concealing

smokes relatively useless, may be turned back by a special smoke. Such smoke would be effective against gun-laying by radar and as protection against guided missiles. He also forecasts poison gases made more deadly by radioactive particles.





Bell Aircraft Corp. photo

### Self-Powered Wheelbarrow

Taking the backache out of pushing a wheelbarrow, a motorized version has a capacity of 1000 pounds and can climb a 20-percent grade with a full load. The three-wheeled machine has a three-horsepower air-cooled engine that runs for eight hours on three gallons of fuel. Transmission, clutch and gears are completely enclosed and no belts or chains are used. Weighing about 400 pounds, it turns in its own length and is narrow enough to go through ordinary doors. The 10-cubic-foot bucket can be replaced with a platform deck. A snowplow attachment is also available.

### Button Snaps Key Out of Case

Keys loaded into a new key case are easily distinguished and ready for use when a button is pressed. The case, made of Tenite plastic, holds two keys, which can be loaded with the notches facing in the direction most convenient for handling. Pushing one of the buttons ejects the key. When the button is released the key snaps back into the case. The keys are identified by different button surfaces.



### Test Machine "Smokes" Cigarettes

Cigarettes can be "smoked" with regular puffs by a machine developed to measure combustion and to determine what unburned residue is left in automobile exhausts. The device's lungs suck in as much air in one breath as the average smoker does from his cigarette, and takes the same time doing it. When it exhales, a filter tape intercepts the "exhaust" and retains the solid content. The machine was built by petroleum engineers in the research laboratories of the Cities Service Company.

### Demountable Battery

In 15 minutes a new demountable battery can be taken apart, repaired and re-assembled, using only a pair of pliers. The plates are suspended from the cell covers, avoiding damage from shock and vibration that often occurs when plates rest on the bottom of the battery.



APRIL 1948  
George E. Cross



# WHAT'S NEW *For Your Home*

Sources of supply for these products may be obtained from Bureau of Information, Popular Mechanics Magazine



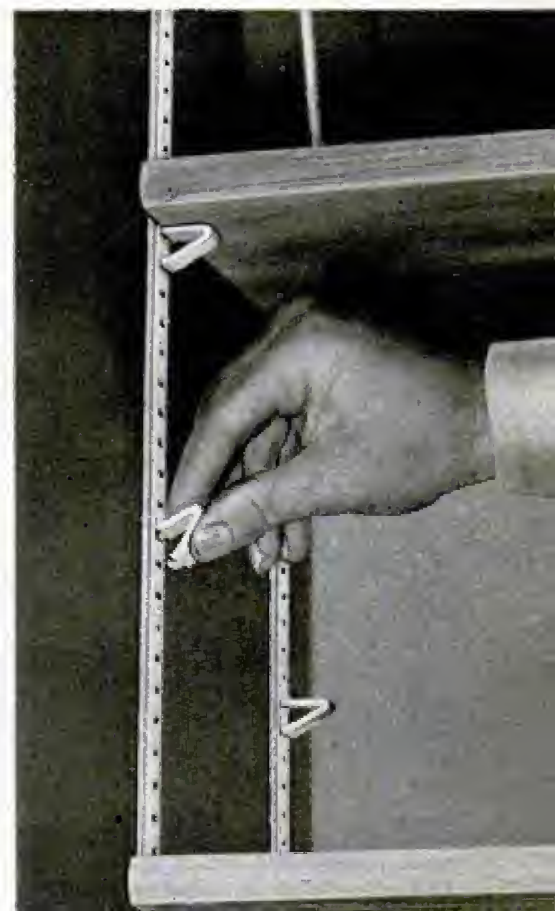
**MAGNESIUM CHAIRS FOLD** for easy storage but when opened they don't have that collapsible look. Thick upholstery provides beauty and comfort and die-cast construction gives them strength

**RANGE HAS A PRESSURE COOKER** that fits into heating element which can be raised for top-of-range cooking when the cooker is not being used. The electric range has automatic time controls



**EGG CRACKERS** made of Tenite plastic prevent burned fingers. One half holds the egg; other removes the top

**SHELF SUPPORTS** with snap-on clips are adjustable to any height. Hammer is only tool needed for installation







**BED HAS PADDED ARMRESTS** built into headboard for comfort while reading or eating in bed. The center section of headboard tilts forward to support the back. When not in use, the armrests fold out of the way

**CORN BUTTERER** ends the problem of chasing the butter around a hot ear of corn. Held inside the curved "spoon" the butter is spread evenly over the ear without any waste or mess

**TAPERED DRAWER** in dining table keeps silverware in convenient place and eliminates knee-cracking by diners. Narrow along its front edge, the drawer doesn't interfere with leg room, but does have ample space for silverware





# WHAT'S NEW *For Your Home*

Continued from preceding page



**FLEXIBLE TABLEWARE** of unbreakable plastic can be squeezed to form a convenient spout for pouring



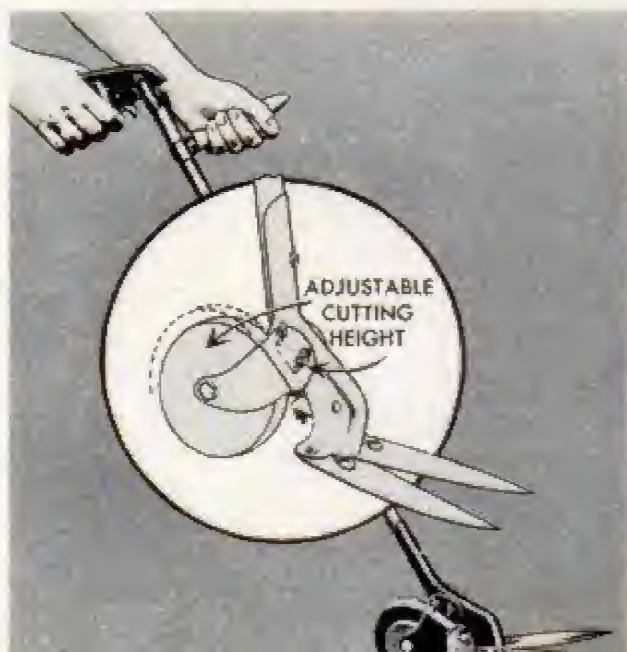
↑ **PASTRY LIFTERS** slip under thin-rolled dough for transferring it to pie plate without tearing

← **CLOTHES RACK** needs no cross rods. Pressure between marbles in the arms holds clothes securely

**BABY CHAIR-TABLE** (below left) has wide surface; slide under top fills opening for use as a table



↓ **STAND-UP TRIMMER** can be adjusted to cut at various heights. Large wheel makes it roll easily







↑ **GERM-FREE NURSING BOTTLES** result when this tool is used. Hands never touch the nipple or bottle

**EGG POACHING** is foolproof with four-egg poacher (right) that cooks eggs in water below boiling point

↓ **INSULATED JUG** has electric element that boils water and keeps it hot for use on the dining table



↑ **SKIRT HANGER** never slips as clothing is held between two nonskid rollers of colorfast plastic







**FORTY-THREE OLD MATTRESSES** and six bales of hay padded a giant Arizona cactus while it was being transplanted from its mountain-slope home of three centuries to a private estate. A Saguaro, largest and least common of all American cacti, it is 38 feet tall and has five arms. The large white blossom is Arizona's state flower. For the unique move, the cactus was lifted and held upright by a 20-ton crane on a truck. Chains tightened with log boomers and a steel plate that secured the base helped prevent swaying on the desert roads



## Electronic "Brain" Has Photo Memory

With its really photographic memory, the Navy's electronic "brain" will memorize mathematical data at a rate of a thousand 12-digit numbers every second. Numbers from the calculator are converted to dark and light rectangles by a cathode-ray tube. A special movie camera, operating at tremendous speed, photographs these rectangles as they flash on the tube. The numbers can be fed back into the calculator for further computation by projecting the developed film on to photoelectric cells that translate the rectangles into numerical values. Eastman Kodak, where the photo-memory device was developed, plans to



Numbers flash on circular scope at left as black and white rectangles (see insert) are recorded on film (right) by special movie camera (center)

build an auxiliary unit that will convert the recorded information into tables of numbers for study by mathematicians.



U. S. Navy photo

## Plywood Air Flivver. Homemade for \$500

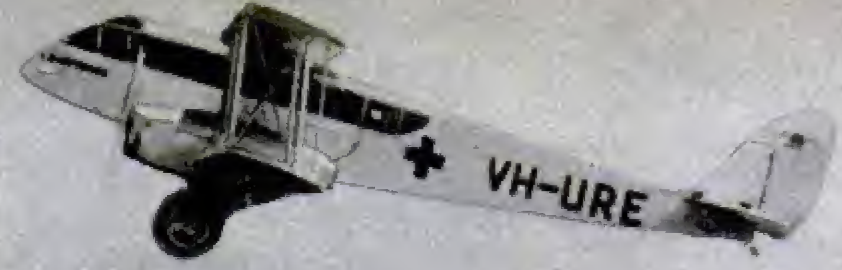

With \$500 and 850 hours of his spare time, Edward O. Effenheim of Milwaukee was able to build a vest-pocket plane with a 143-mile-an-hour top speed. The plywood flying flivver's wingspan is 15 feet and it is 13 feet 6 inches long. Effenheim, a student pilot and a licensed aircraft mechanic, expects his craft to have a 400-mile range.



## Navy Chute "Blows Top"

For 500-mile-an-hour bail-outs, the Navy has a new parachute that "blows its top" during the initial heavy stress. Immediately after bail-out, a six-foot-wide "cap" extends on elastic cords, spilling the air out the top. The cap is drawn back as the chute slows down, spillage is reduced and the rate of descent is gradually decreased. Using dummy bombs to simulate bodies, it has been drop-tested at speeds twice as great as those present types will withstand. The designer is a veteran parachute rigger at the Navy's Lakehurst, N. J., base.





## ***FLYING DOCTORS***

Radio plea for help sends a flying doctor on house call a hundred miles away

**I**N THE "Never-Never" land of northern Australia — the rugged territory where neighbors live a hundred miles apart — doctors are on 24-hour duty. A message by radio from one of the transmitters in the lonely outback homes sends the medics by plane on a call hundreds of miles away.

These are Australia's flying doctors. They provide a mantle of medical attention for the 2,000,000 square miles of sparsely settled country. No spot in Australia is more than 300 miles from a flying doctor. Recently a five-year-old boy was saved

after a 400-mile flight and an operation performed by lamplight.

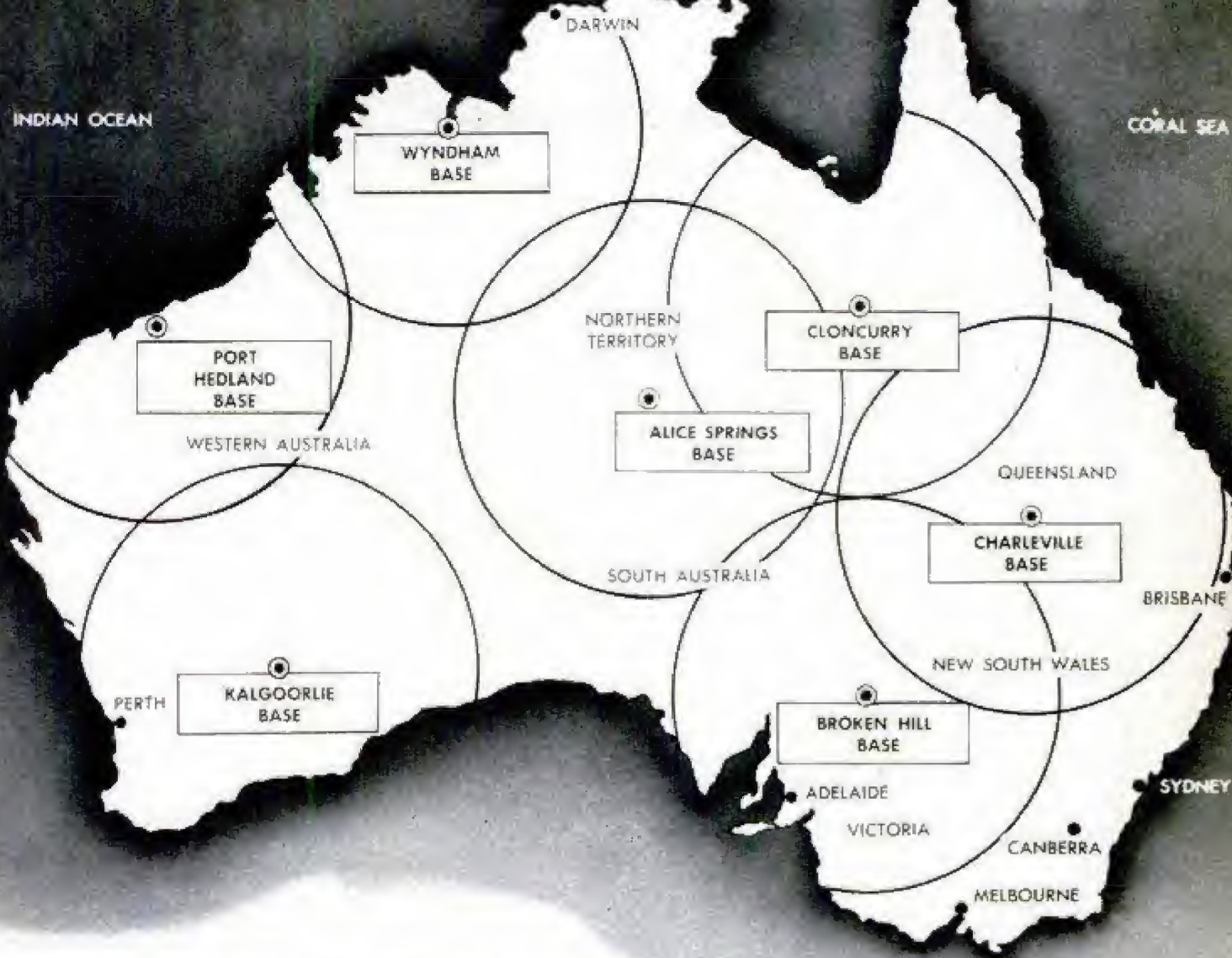
Seven towns provide bases for the Australian Aerial Medical Services — the organization's official name. Doctors covering the Queensland area alone wing their way over 60,000 miles a year.

The idea of blanket medical coverage for the Never-Never land was conceived by the Rev. Dr. John Flynn, who once patrolled the "inland" with medicine in his camel pack. He started the organization with a nursing home at Oodnadatta.

Doctor, pilot and helper lift a stricken patient aboard the airplane for a quick trip to the nearest base hospital







But a trek by camel or horse takes time, and emergency treatments can't wait. Flynn saw that only aircraft could cover the interior fast enough. He decided that flying doctors operating from medical bases offered a solution.

Communication was another stumbling block. The type of radio set Flynn needed had not been developed at that time, so he built a portable set so simple that any member of the household could operate it.

The 250 sets scattered across the interior today are more than links with the flying doctors. They have become the telephones of the outback settlers, and the postmaster-general has registered the sets to transmit telegrams to any part of the world.

Lonely housewives use the wireless to talk to their neighbors a hundred miles away. On-the-air time has been allocated for what are called "over the fence" chats so womenfolk can exchange gossip daily.

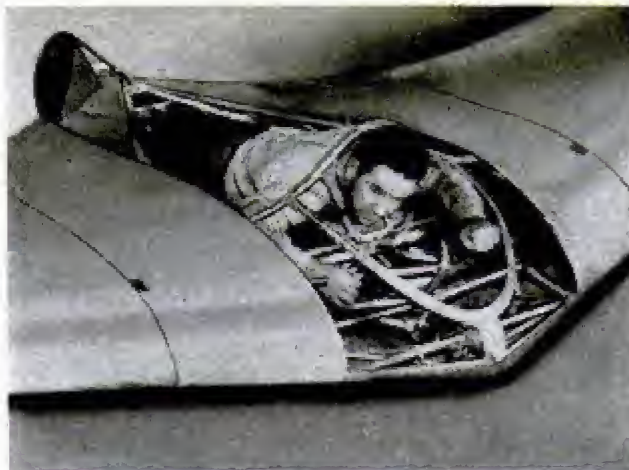
But essentially the network is for medical service. Relatives of a sick person call the hospital and the doctor gives instructions. If it's an emergency he hops in the plane for a call a hundred miles away.



Doctor and nurse land as near the patient as possible, then wade floodwaters carrying medical kits  
↓ Radio operator listens for the outback stations







## Designers of Flying Wings Study Secrets of "Strato" Glider

Called the "nearest thing to a bird ever built," the Horten 6 German glider has a 78-foot wing. It holds the world's altitude record of 39,000 feet for engineless craft. The pilot crouches under a plastic bubble and controls the glider with a conventional wheel and tiny toe-rudder pedals. One device simultaneously releases the pilot's safety belt and jettisons the metal hatch cover for emergency bail-out. The craft is being studied by Northrop aircraft engineers at Hawthorne, Calif., for possible design improvements on current-type flying-wing aircraft, like the giant B-35.

## Flying Trapezeist Rides Helicopter

Even the "daring young man on the flying trapeze" would have to take a back seat for Marilyn Rich, a 24-year-old circus performer. From trapeze equipment wired beneath the landing gear of a helicopter, she does full body spins while dangling by one arm from the end of a rope. Miss Rich's mark of 402 consecutive turns is a world's record for this specialty.

You may wish to obtain additional information about new products described each month in *Popular Mechanics*. If you want to know the name and address of the manufacturer, just write Bureau of Information, *Popular Mechanics*, 200 E. Ontario St., Chicago 11. Your letter will be answered promptly





# GUARDIANS of the RAILS

**I**F JESSE JAMES had started his crime career as a train robber in 1948 instead of 1867 the chances are it would have been nipped in the bud. An alarm would have gone out from alert railroad police to marshal a network of local and state patrolmen and Mr. James soon would have been on his way to the cooler instead of a 15-year career of crime.

Railroad special agents—the policemen of the iron roads—may not be as picturesque as they were in the six-shooter era, but they are far more lethal. Rail-riding travelers are little aware of the invisible protection provided by this unpublicized branch of rail-roading. The majority of railroad police, like the G-men they emulate, are in plain clothes. They make use of every modern means of crime prevention and detection from the lie detector to spectrographic analysis.

Delbert L. Wood, chief special



Here's how Illinois Central detective spots prowlers (often escaped convicts) around freight cars in the yards at night. Below plain-clothes man (arrow) looks for station pickpockets







Lt. C. J. Buttmer of the Illinois Central police placing seal on freight-car door. This seal consists of a loop made of a metal strip and must be broken to open door. If cargo is particularly valuable, latch (above) is "hog tied." Flat nail is pushed through the slot and one end twisted into curly pigtail effect

agent of the Illinois Central Railroad and a former G-man, recently initiated a system which has gained him national renown for training these guardians of the rails. As chairman of the education committee of the Chicago Railway Special Agents and Police Association, he organized a training course of 10 sessions conducted by the Federal Bureau of Investigation, state, county and city police departments. The G-men stole the show with an array of talent and systems for detection that had

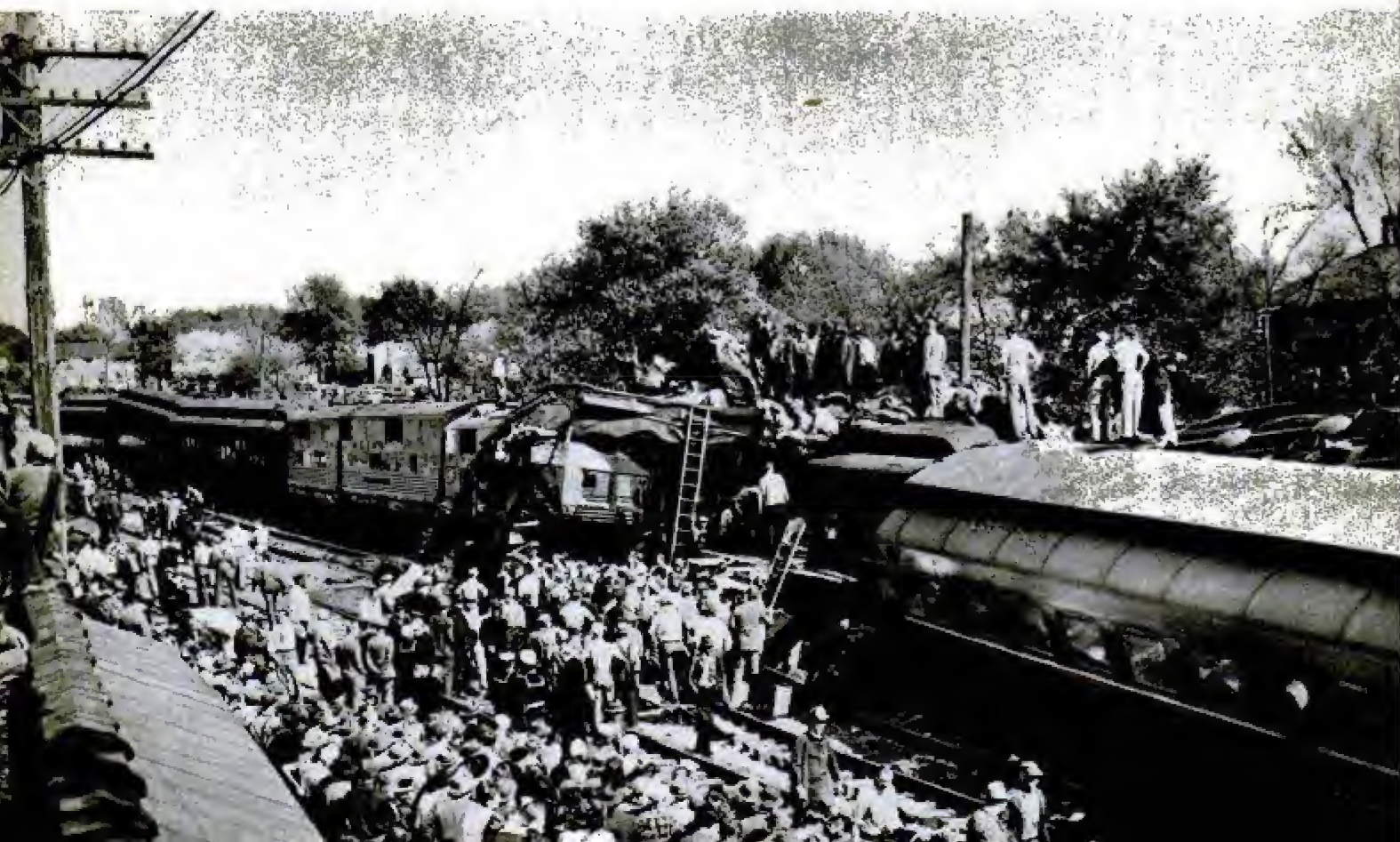
the most hard-boiled coppers jotting down notes like schoolboys.

The criminals who receive the undivided attention of the railroad police are: train wreckers, robbers, burglars, pickpockets, and the hybrid and garden varieties of confidence men.

FBI agents have plenty of firsthand information on hunting down train wreckers. This crime is a federal offense if a train is engaged in interstate or foreign commerce.

In the case of a train wreck, the investi-

Railroad police rush to wreck scenes like this one to obtain clues before they are all destroyed by onlookers





gative work is divided into an immediate and necessarily hurried search of the scene for clues, a terrain search of the vicinity and a neighborhood investigation. Train wreckers are no different from other criminals in one respect, says the FBI—they are sure to leave clues at the crime scene.

Some months ago after a wreck in the East, local and railroad police were baffled and called in the FBI. One clue at the scene was obvious enough—a 185-pound iron casting from a mine car. A terrain search had revealed that the casting had lain along the right-of-way for some time



Lt. J. C. Buttmer takes stroll in the Illinois Central's big Markham Yards near Harvey, Ill., to check a few freight-car seals to see if his inspectors are on their toes. Inspectors can spot a tampered seal 20 feet away

and probably had not been dragged there for the purpose of wrecking a freight. The police concluded, logically enough, that a strong man had moved the casting onto the rails. This belief made the case unusual because a great majority of train wrecks are caused by juvenile criminals.

As the wreck had occurred in an out-of-the-way community where strangers are a novelty, it seemed likely that the criminal was a local adult male. A thorough investigation proved this premise to be wrong. At this point, the FBI launched an exhaustive neighborhood investigation. Every person in the vicinity was questioned not only about his own comings and goings, but about everything he or she had seen and heard during a period going back to several weeks before the wreck. Finally, one old lady recalled having seen a strange boy skating along a creek which ran near the railroad track about two weeks before the wreck. If the FBI investigator had dis-

missed this clue as being of no value (due to the weight of the casting) the case might never have been solved.

They found that the strange boy, who lived in a nearby town, had been visiting his grandparents, and established his identity. He was a husky lad about 13 years old who had a good reputation in his community. The investigators also discovered that he had returned to visit his grandparents the day of the wreck. When confronted by the FBI he not only confessed but demonstrated how he had dragged the heavy casting onto the rails.

Here are a few tricks in modern sleuthing passed along to the railroad police by the G-men:

In looking for clues don't overlook anything as insignificant as a cigarette butt, a hair or a torn piece of any type of clothing—particularly if it is cloth that may have been laundered. Most laundries in the U. S. put an invisible mark on clothing





Lt. William Bangert inspects rifled carton of expensive perfume. Packages like this are held by police while order is traced. Below, freight under guard



which passes through their plants. These marks, visible only under ultraviolet light, are registered with the FBI. A cigarette butt may not "put the finger" on a criminal but can be helpful in eliminating suspects. The saliva, if any, on the butt can be typed just as human blood is typed. Hair has racial classifications.

Any cutting of signal wires or air hose done with a sharp instrument, such as a pair of nippers, provides a valuable clue. No sharp tool, whether chisel, knife, plane, nippers, or even a razor, is so finely ground that it doesn't leave some jagged and distinctive marks. Microscopic examination of a cut can be matched with the tool that made the cut to provide indisputable evidence. Also when a wire is cut, microscopic particles of the wire are left on the tool that did the job. Spectrographic analysis reveals the exact metallic composition of the wire and the loose particles.

Ordinary dirt found near the scene of a crime also can be an important clue. In making a terrain search investigators are on the alert for particles of dirt unlike those of the immediate area. A piece of dirt from a criminal's heel or from the tread of a tire has helped solve many crimes.

The obvious clues, such as fingerprints, footprints and bloodstains are never to be overlooked. The railroad police have at their disposal the great fingerprint files of the FBI in Washington.

A footprint found in the dirt can be preserved, as every policeman knows, with a plaster-of-paris mixture. But what if the footprint is found in the snow? The FBI merely dusts the print with talcum powder or flour before pouring in the plaster of paris. Results are excellent.

Fast-working boxcar thieves occasionally gash a finger and leave bloodstains. How can you tell whether a stain which may be any color is blood? A few drops of a solution composed of equal parts of benzidine and hydrogen peroxide will cause the stain to turn blue or bluish purple if it is blood.

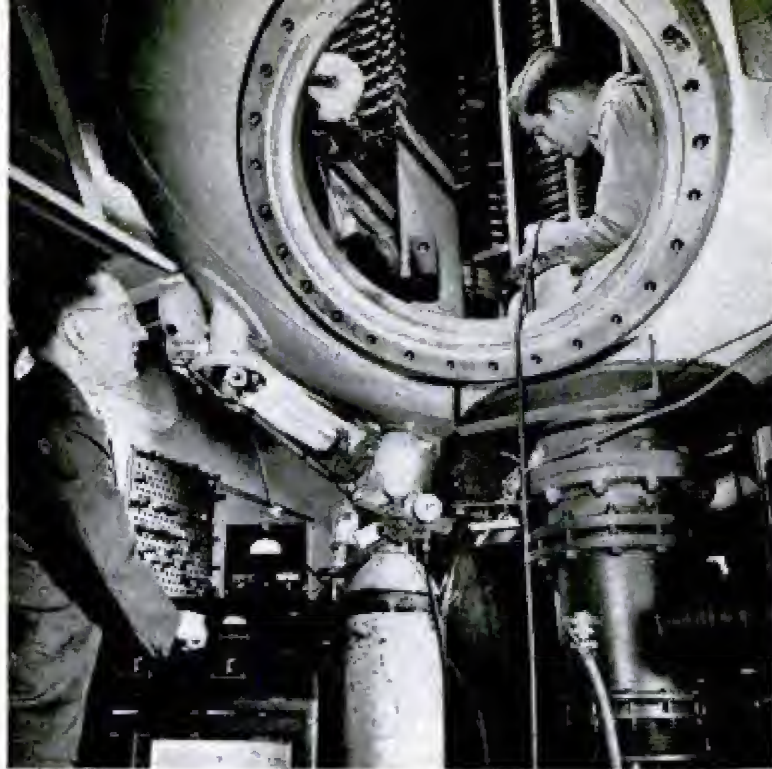
At the training session for railroad police in Chicago, FBI instructors stressed the importance of terrain search. Every inch of ground around a crime scene should be surveyed. Wooded areas, places with heavy undergrowth, creeks or gullies present a problem. This is often the type of terrain in which a train wreck occurs. A careful search of such an area can be made with a team of four or five men and several balls of twine. First, some sort of boundary line such as a fence or creek is decided upon. Working within arm's reach of each other the men start out walking abreast. The man walking farthest from the boundary

(Continued to page 248)



## What Holds Atoms Together? Scientists Seek Answer

What mysterious force keeps the core of matter from exploding like an atomic bomb? According to electrical theory, the nucleus should explode rather than stick together, as it is made of positively charged protons and neutral particles called neutrons. Since like charges repel, protons could be expected to blast one another out of the nucleus, according to Westinghouse scientists who recently launched an extensive research campaign on the subject. Actually, the protons stick together with tremendous tenacity, and it is this binding force that technicians are attempting to analyze and measure. The principal tool of the research program is the Westinghouse 47-foot-high atom smasher, which fires "atomic bullets" at a target with great accuracy, permitting scientists to measure the force required to break atoms. The atom smasher was tested for its newest assign-



Scientists check atom smasher with detector that finds a leak so tiny it would take 3000 years to deflate an automobile tire

ment by spraying helium along every inch of surface joint. Leaks in the system were detected by an electronic "sniffer."



## Cameraman Chases Bowling Ball To Film Close-Up of a Strike

When cameraman Norman Alley filmed a bowling ball in action he provided more action than the ball. Fastening his movie camera to a broom, he removed his shoes and chased the ball down the alley pushing the broom a foot or so behind it. The resulting film shows the ball from start to finish of a perfect-strike roll.

Top left, Alley gets away fast after the ball. Top right, at full speed one Alley flies over the other alley. Right, the camera films the perfect strike



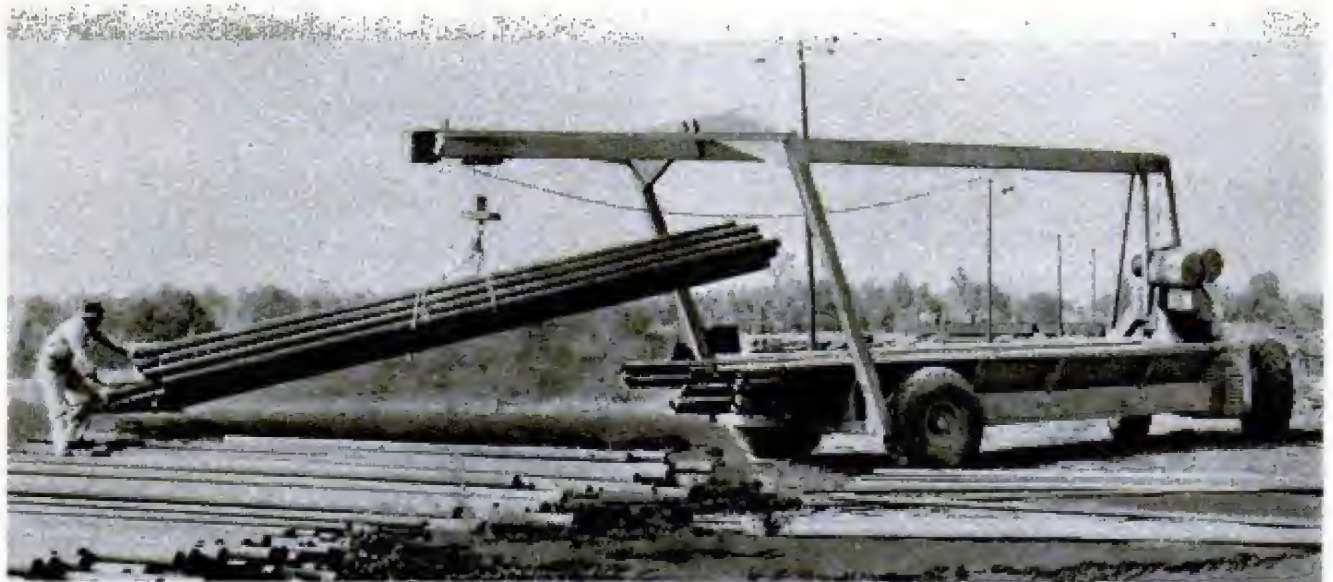




## Man-of-War Becomes Home-of-Peace for Japanese Family

Beating swords into plowshares is given a novel twist by a Japanese laborer at the Hiroshima shipyards. He converted part of the former battleship Ise into a comfortable

home for his family. Formerly the officers' quarters, the superstructure is mounted on a rock base. The admiral's stateroom serves as the family bedroom.



## Self-Loading Truck Has Built-In Crane and Trolley

With a built-in crane and trolley a new truck can load and unload almost any type of material. The vehicle, mounted on large rubber tires, has a loading capacity of 100 tons and can move down the highway or across rough terrain. Powered by a Diesel engine, the truck has a differential that

supplies the most power to the wheel that has the firmest footing. When equipped with the crane and trolley the vehicle can be used to load and unload heavy pipe or logs or other cumbersome material. The two-wheel prime mover permits 90-degree turns for increased maneuverability.





Pennsylvania State College photo

Dr. Henry L. Yeagley releases bird to test theory that earth's rotation and magnetism guide it

## HOW DO PIGEONS NAVIGATE?

By Clifford B. Hicks

**H**OW DO homing pigeons find their way home? A Pennsylvania State College scientist has come up with a fascinating answer to the pigeon puzzle, one of the two popular mysteries that have baffled six-year-olds and scientists for centuries. The other—how bats fly in total darkness—was answered a few years ago when scientists discovered the bats' built-in radar system.

Now, Dr. Henry L. Yeagley has probed the pigeon riddle and discovered a possible answer to the bird's navigating ability.

Pigeons often fly amazing distances over unfamiliar terrain to find home sweet home. Probably the record flight was one from Alaska to California in which the bird plugged along for 3000 miles to find its nest. Pigeon races of 1000 miles are not uncommon.

**Homing pigeons are bewildered by Dr. Henry L. Yeagley. He can make them flutter in circles or fly straight away from home, thereby giving an answer to the puzzle of the homing instinct**

According to Dr. Yeagley, pigeons can navigate because they are sensitive to two influences. A built-in "instrument" enables them to sense the effect of flying through the earth's magnetic field. And they also are able to sense latitude as though the earth were a grid-work map below them.

Sound impossible? Listen to Dr. Yeagley build his case.

In simple terms, the theory states that pigeons grow accustomed to the "feel" of these two effects at their home point, and can follow these guiding influences to their home when released some distance away.

In 1941, Dr. Yeagley's 15-year-old son brought home a pair of carrier pigeons. The scientist was fascinated by the birds and decided to





Pigeons carry message containers in the experiments. At right are shown the instructions to finder of bird

seek a solution to the old pigeon puzzle.

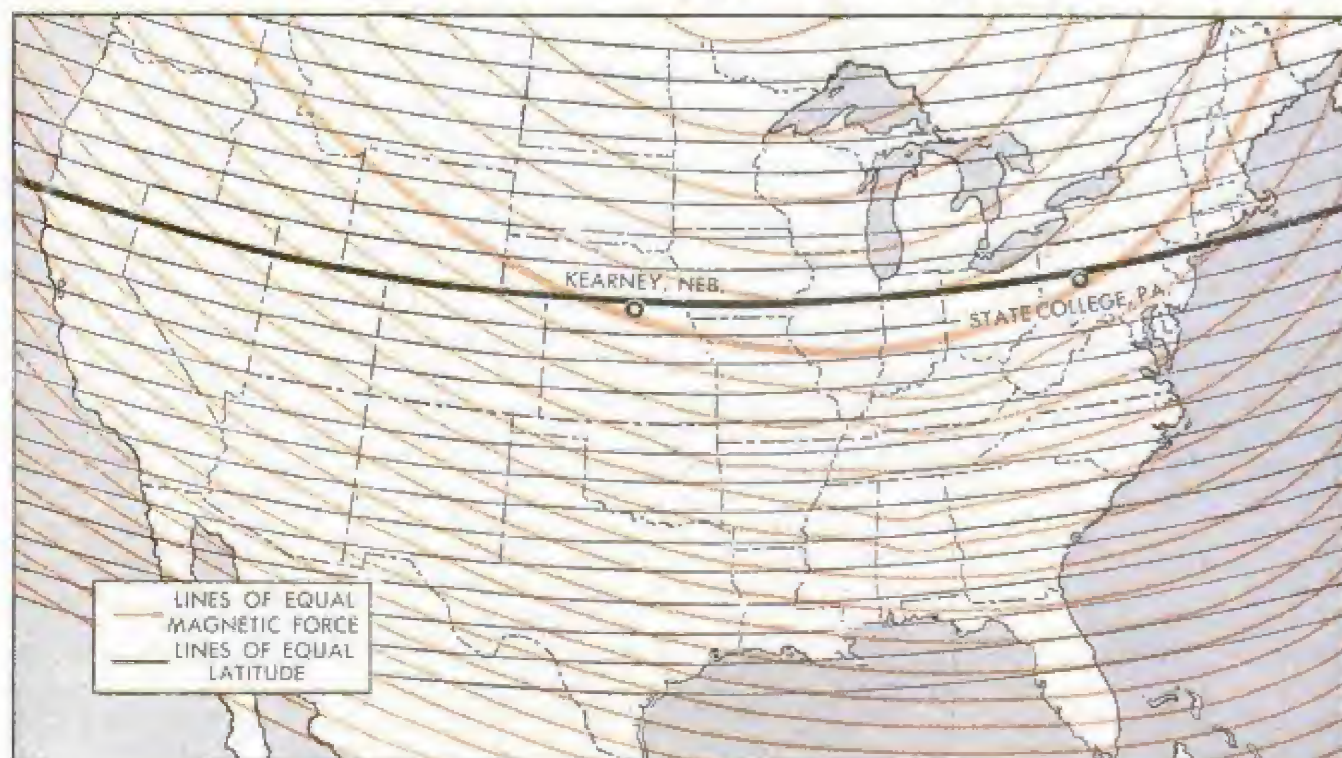
By a process of elimination he theorized that pigeons react to the earth's magnetism. How could he test this magnetic sense? A friend trained 20 birds for him to use in his first experiment. To 10 of these the scientist attached small magnets. The other 10 he equipped with copper plates, identical to the magnets in shape and weight. When the birds were released, eight of the 10 with the plain copper plates returned home during the first two days. Only one of the 10 with magnets on both wings ever came home and he was a weary bird when he settled down on the loft the fourth day.

The wing magnets, says Dr. Yeagley, had

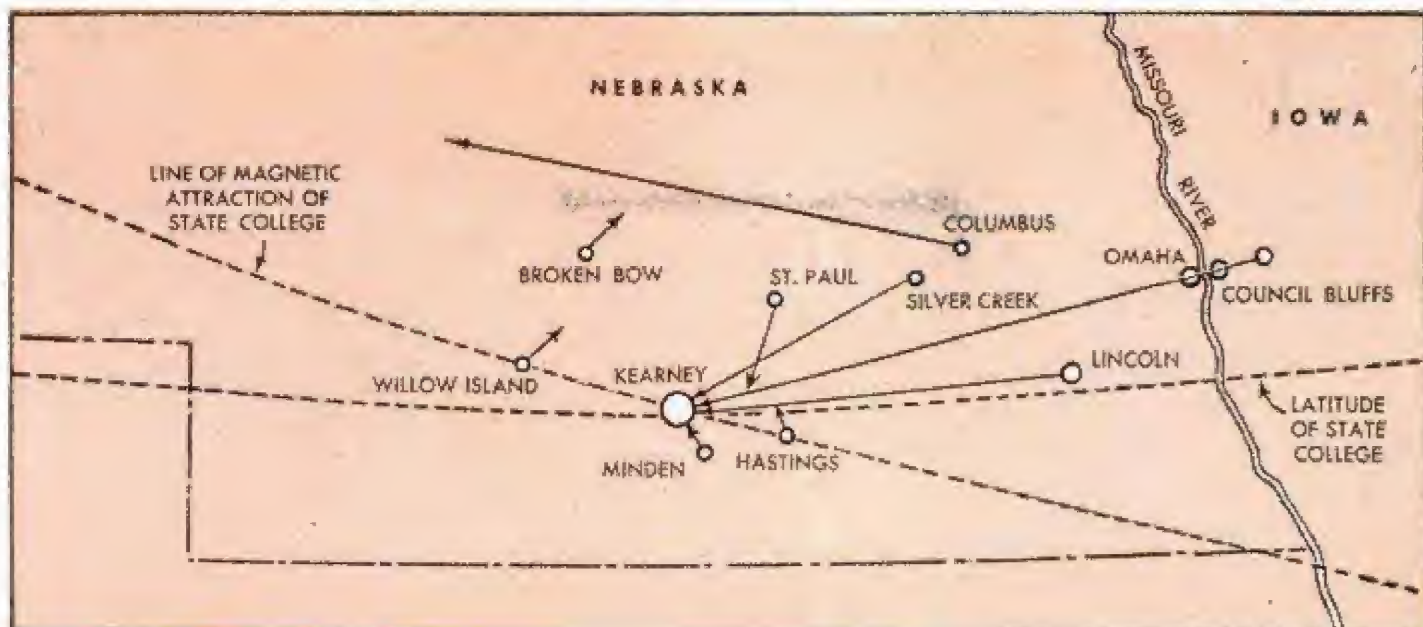
set up conflicting magnetic fields which confused the birds. This proved that pigeons can sense magnetic attraction in much the same way that a blindfolded man in a room, cold at one end and warm at the other, can easily walk toward the warmer end by sensing the change in temperature. But this ability alone would not account for the pigeon's homing ability, as a bird could fly around the world on a line where the strength of the magnetic field was identical to that at its home loft.

Whereupon Dr. Yeagley theorized that pigeons also can sense latitude. In this field, a ready-made explanation awaited him. The missing element could be the Coriolis force, an effect created by the spin

Note how the same lines of magnetic force and latitude intersect at State College, Pa., and Kearney, Neb. Because these two influences guide the birds, Dr. Yeagley's Pennsylvania pigeons fly "home" to Nebraska







of the earth. It's this force that turns whirlpools of water in a counter-clockwise direction in the Northern Hemisphere, clockwise in the Southern Hemisphere. The force is constant along any line of latitude, and its effect is exerted on any body moving above the earth.

If a bird could detect this force, Dr. Yeagley reasoned, why couldn't it fly directly to a line of latitude where the force was the same as that at its home? And why couldn't it pin-point its home by flying to a spot where both the magnetic and Coriolis effects were familiar, in much the same way that two intersecting lines determine the location of a point on a map?

Dr. Yeagley took a look at a government map showing lines of magnetic-field intensity and lines of latitude. He found that any line of magnetic force which crosses a latitude line always intersects it again. After locating the lines that intersect near the loft at State College, Pa., he traced them westward and found that they intersect again, and at about the same angle, near Kearney, Neb. Dr. Yeagley reasoned that, according to his theory, a pigeon trained to fly to State College would fly to Kearney instead, if released nearer the latter point.

A few other odd facts about homing pigeons turned up in his research. He determined that pigeons "navigate" by natural know-how over long distances, but "pilot" the last 10 or 20 miles to their loft by recognizing familiar sights. And he found that pigeons have an internal "speedometer" in order to check their land speed. About this time the Army Signal Corps became interested and subsidi-

Arrows on map represent pigeon flights during Nebraska experiments. Note how most of them converge on Kearney. Below is pigeon that flew 185 miles west from Iowa, directly away from home to find its loft in Nebraska field



dized Dr. Yeagley's work. With the help of Maj. Otto Meyer and Dr. P. F. English of the Pennsylvania Wildlife Research Unit, he undertook his first major experiment.

The scientist trained 100 pigeons to home to State College. Their loft was designed with a conspicuous steeple and painted a bright yellow. When all was ready he shipped the birds west. At the same time he moved the loft to a "conjugate point" 10 miles north of Kearney. A conjugate point is a spot where the magnetic field and latitude are the same as the training point. He released the birds at varying distances from Kearney.

Dr. Yeagley believed that there was little chance a bird would go to the displaced





Magnets fastened to wings confuse the bird, proving that pigeons can sense magnetic attraction. At right is a standard Signal Corps loft, used during the war after the Army became interested in the experiments

loft, as there were no familiar terrain features to enable it to pilot the last 20 miles. He wanted only to find out whether the birds would fly toward State College or toward the location of their displaced loft in Nebraska.

The results were amazing. Eight flights of birds were released. Six of those flights were in the direction of the new loft site and terminated within 10 miles of the loft. Three of the six ended very close to the loft. And one pigeon released in Iowa flew 185 miles straight west, directly away from State College, and found and entered its

tiny loft in a Nebraska grainfield 1000 miles from its original home.

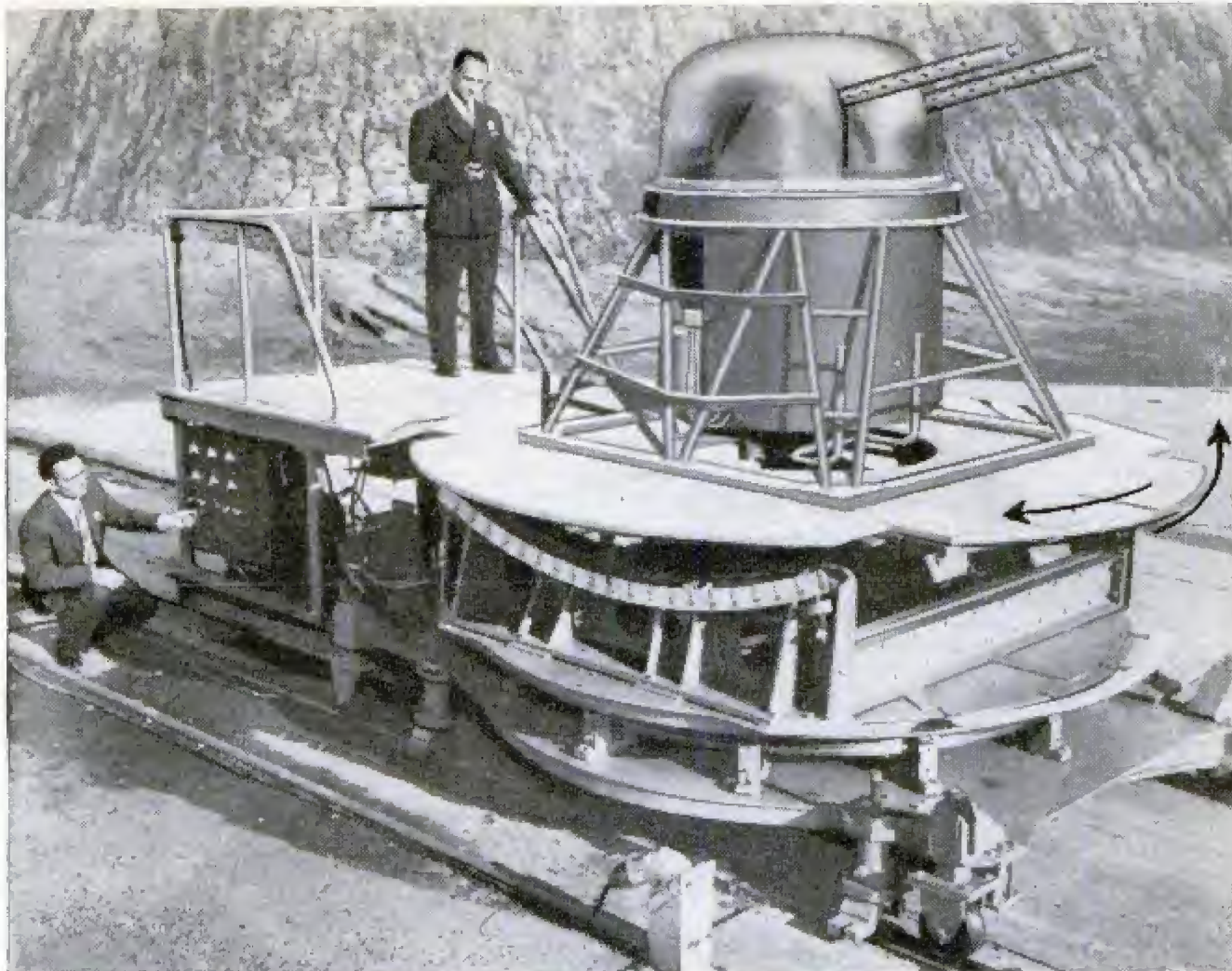
In another experiment a pigeon fancier at Cozad, Neb., trained 12 pigeons to return to their loft at his home. They then were shipped east and released singly at Berkeley Springs, Va. They were found along a flight line in the proper direction toward the conjugate point in Pennsylvania and within 10 miles of the same latitude line that passes through Cozad. If the terrain had been familiar they could have piloted home in a breeze.

(Continued to page 246)



First mobile loft had prominent steeple and was painted bright yellow so pigeons could spot it on Nebraska grainfield



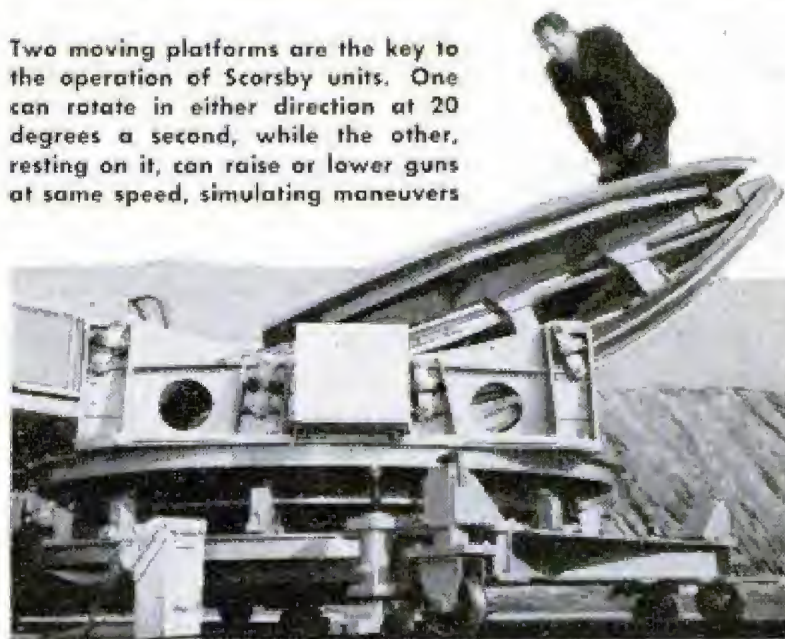


Martin Aircraft Company photos

## Bucking Turret Tester Imitates Planes

Gun turrets for Navy planes will be tested on earthbound Scorsby units that simulate all the motions of maneuvering aircraft. Scorsby was the name of a destroyer famed for its excessive rolling. The units consist of two electrically operated moving platforms. One can be elevated in either direction at speeds up to 20 degrees a second and the other rotated at the same speed. Operated simultaneously they can simulate any type motion of a plane in flight.

Two moving platforms are the key to the operation of Scorsby units. One can rotate in either direction at 20 degrees a second, while the other, resting on it, can raise or lower guns at same speed, simulating maneuvers



## Pigment Made From Sand Reduces Lead Required in Paint

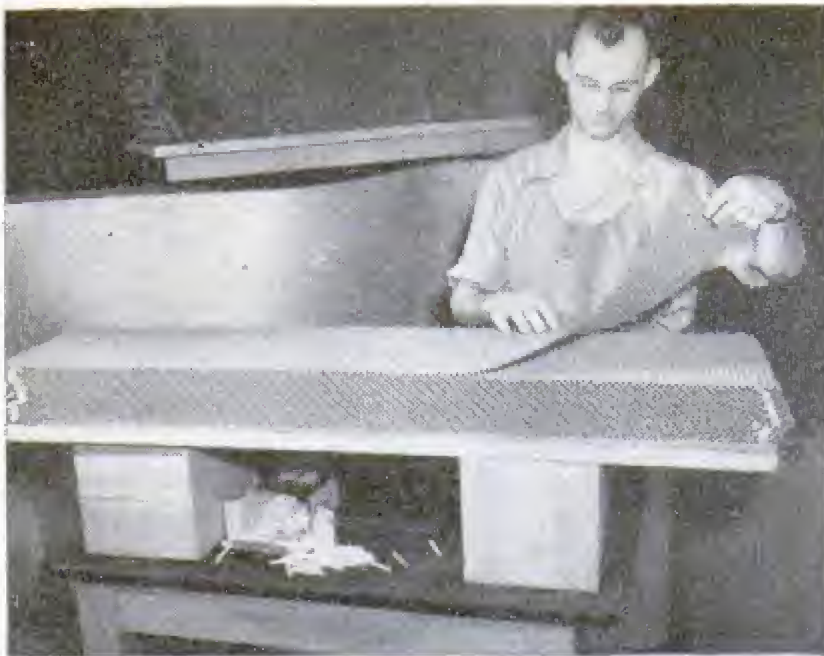
Three times as much paint can be made from the same amount of lead when a new pigment is used, according to F. J. Williams and A. R. Pitrot of the National Lead Company. Exhaustive tests have shown that the new pigment is equal in performance to lead pigments now used, despite the small amount of lead required. The pigment is produced by grinding silica

sand to extremely small particles. Lead oxide then is added with a small amount of sulphuric acid, converting part of the lead oxide to lead sulphate. The mixture is dried and heated in a furnace to produce a pigment with particles having a thin coating of lead silicate and lead sulphate. Because only the surface of the particle fortifies paint, a saving in lead is possible.



# SANDWICH WALLS

Sandwich wall panels with cores made of corrugated paper are being tested by the U. S. Forest Products Laboratory for possible use as a building material. An experimental structure has been built with the panels to study the resistance of such construction to weather and climate. The panels are made by gluing a cover of thin, strong material on either side of a thick, light material such as corrugated paper. This "sandwich" construction gives the panel surprising stiffness and strength. In addition, the core is a honeycomb which provides excellent insulation. The cover can be made of metal, plywood or veneer and the panels can be joined without a framework. They can be factory made and finished for either exterior or interior walls. Under test in the structure at the Forest Products Laboratory are panels faced with aluminum, plywood and veneer. Such facings are fastened to the core material with modern glues that make a joint stronger than the material itself. These panels are exposed to all kinds of weather in tests to check their resistance under extreme conditions. The panels originally were developed for wartime use in high-speed aircraft.

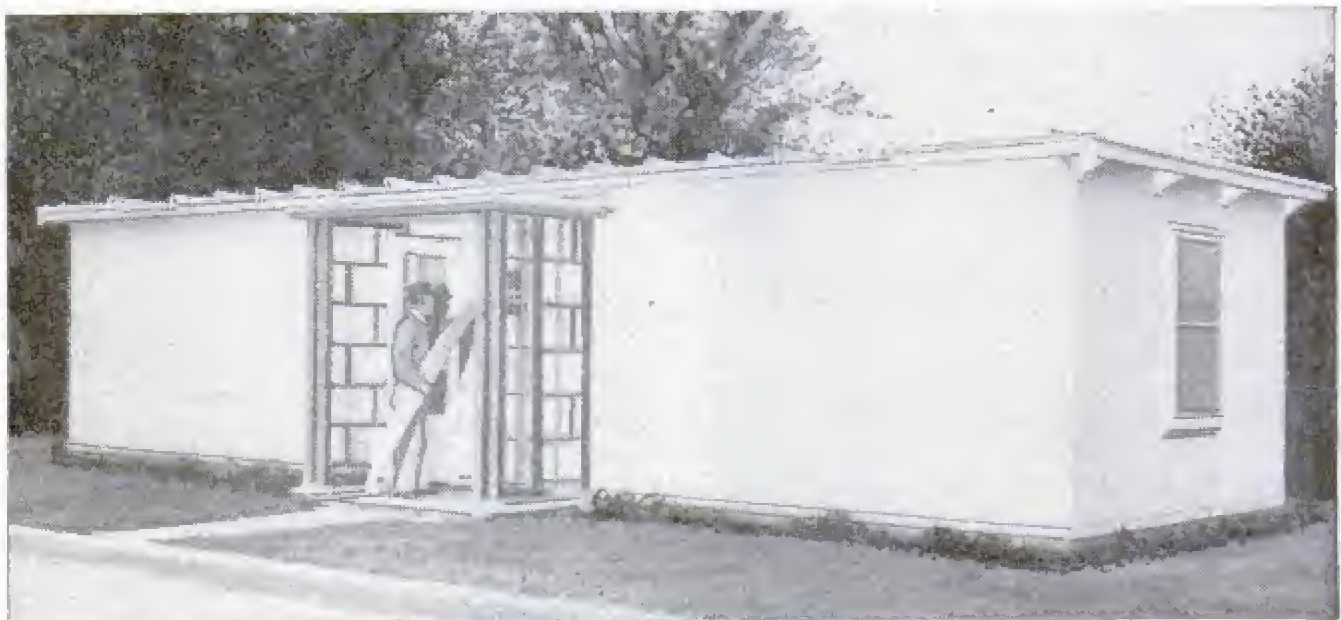


Sheets of corrugated paper are stacked to form a honeycomb core



↑ Aluminum facing is glued on each side of the core to form a panel

↓ Panels are installed in test building to check weather resistance







The hinged bow, so closely fitted that the joint cannot be seen, gives the ferry a streamlined appearance

## Danish Sea-Going Ferry Has Landing-Craft Bow

With a streamlined bow that opens like those on wartime landing craft, a sea-going Danish ferry can carry 30 railway cars and 1500 passengers at a time. Rounded deck houses and raked masts and funnels give the ferry a modern appearance in sharp contrast to conventional boats of its type. The wheelhouse and foremast are of aluminum to eliminate magnetic dis-

turbances to navigational instruments. A radar tower above the chart room is high enough to provide an unobstructed "view" in all directions. With two rudders, one at each end of the vessel, the ship can be maneuvered easily in crowded harbors. Powered by two Diesel motors with a maximum indicated horsepower of 5450, the 353-foot ferry cruises at 16.5 knots.

Taller than the funnels, the plastic-domed radar mast has an unobstructed "view" in all directions

In unloading, the bow is raised by air pressure to permit freight trains and trucks to roll off easily







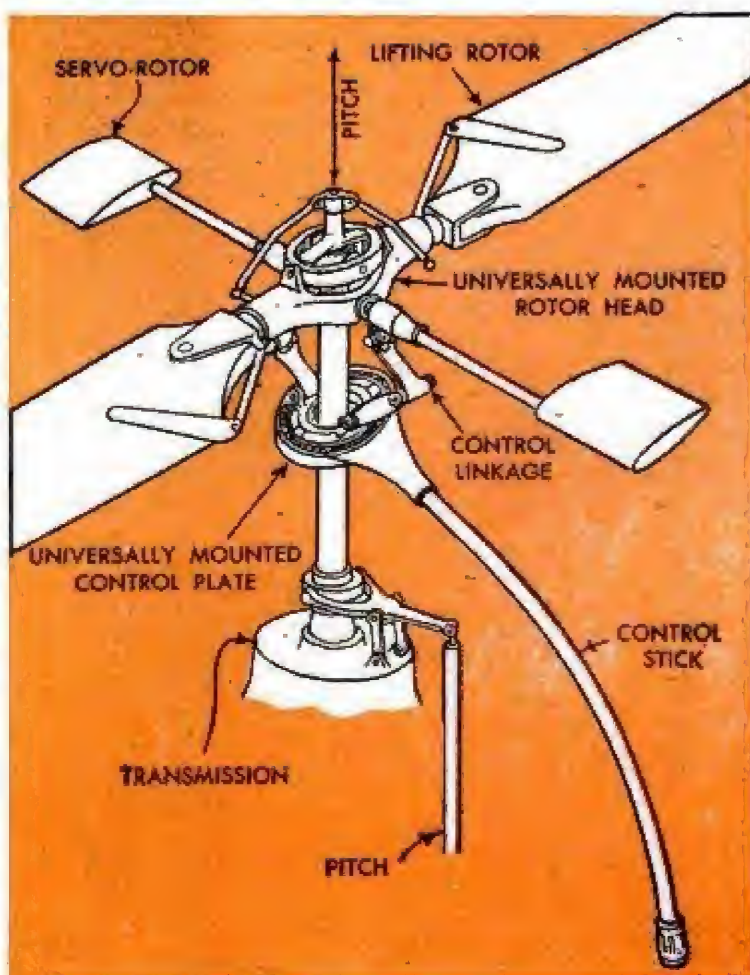
## LOOK, NO HANDS!

**L**EARNING to fly a helicopter is easy with a new control system that responds to fingertip pressures and allows hands-off flight in any attitude. A major objection to helicopters has been that two hands were needed to maintain control.

In a demonstration, the pilot sped around a 30-acre course at about 80 miles an hour and brought the craft to a full stop with both hands off the controls. Only a light touch of the control column is needed to correct for wind gusts while hovering. A man with no helicopter experience took off, hovered and landed after eight minutes of ground instruction.

Developed by United Helicopters, Inc., Palo Alto, Calif., the system has two small servo airfoils mounted at right angles to the main rotor blades and attached to the control stick by a scissor linkage. There is no direct connection between the airfoils and the rotor blades. The entire rotor head is mounted on a universal joint.

The servo airfoils are inclined the way the pilot pushes his control stick. This causes the entire rotor head and its blades to tilt so that the helicopter moves in the desired direction. Spring loading of the control stick makes it movable with less than a pound of pressure. Instead of sev-





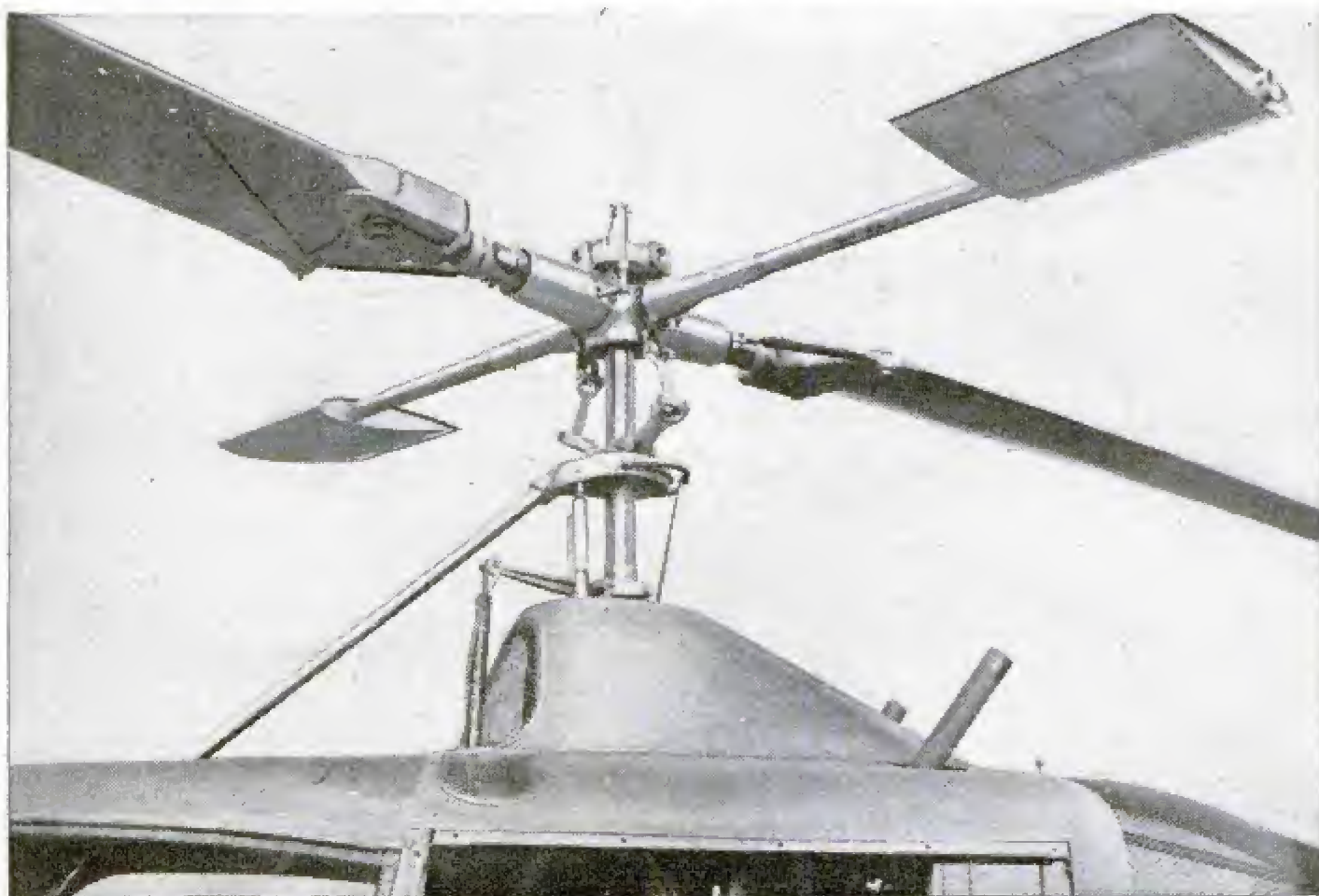
eral hundred moving parts that comprise other control methods, the system has but seven.

The airfoils return to neutral when pressure on the control stick is released and the craft comes to a stop in the air. The self-dampening effect of the airfoils eliminates any tendency toward oscillation. Trim tabs can be adjusted and locked to keep a desired speed and altitude for flying hands-off.

The system opens up possibilities of much larger blades than are now practical. It is adaptable to all types of rotary-wing craft and has been initially incorporated in the company's three-place Hiller 360 helicopter. It has two main rotor blades, 34 feet in diameter, and two 5½-foot blades in the anti-torque rotor at its tail. The craft carries an unusually large load, equal to more than a third of its 2100-pound gross weight, including fuel and oil.



First helicopter using the simplified control system is Hiller's 360 model, above. Less than a pound of pressure on the control stick guides the craft. Below, close-up of the rotor head. In contrast to the several hundred moving parts of other systems, this method involves only seven





DETROIT 13, MICH.



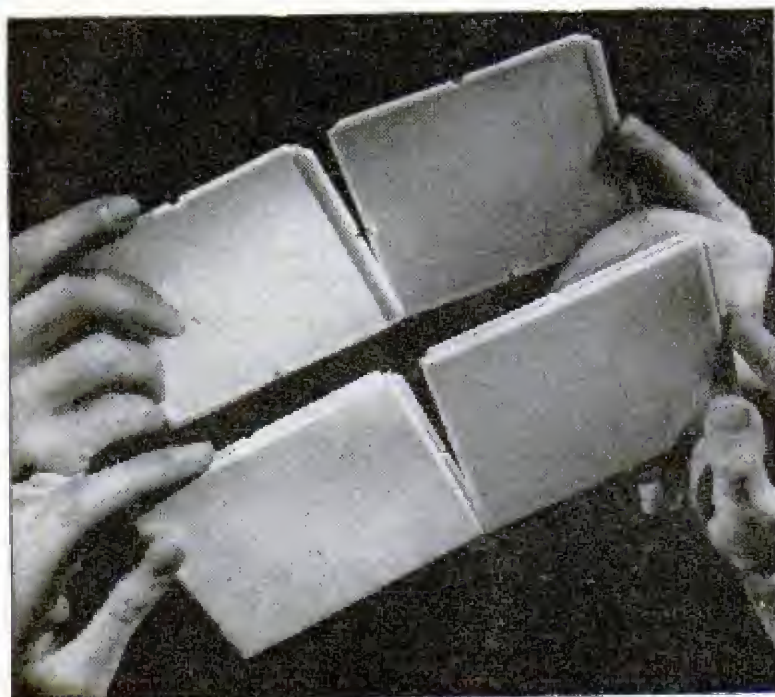
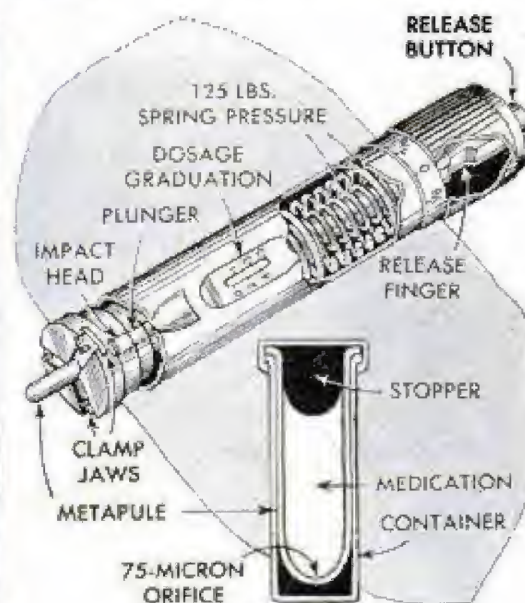
## Homemade Racer Powered by Battery

Surplus plane parts and an old Mercedes starter motor were used in making a battery-driven midget car for Bobby Brown of Pasadena, Calif. It can travel 2½ hours at a top speed of 10 miles an hour before the 6-volt auto battery needs charging. The differential was part of a B-17's flap control and the steering unit was made from the dive-flap actuator of a P-38. His father, who built the car during his spare time in 2½ months, is adding a racing-car body.

MANUFACTURED BY  
R. P. SCHERER CO. INC.  
9425 GRINNELL AVE.,  
DETROIT 13, MICH.

## Hypodermic Spray Replaces Needle

Hypodermic injections are given painlessly with a high-pressure spray device that looks like a flashlight. No needle is used. Instead the instrument is merely held against the skin. Medication is forced through the skin in a fine spray when a spring-loaded plunger is released, driving the stopper into the Metapule capsule. The injection takes three seconds.



## Interlocking Tiles

Tile squares that can be installed on kitchen or bathroom walls have a tongue-and-groove edge that makes them self-aligning. No molded cement seam is required between the squares, as the interlocking edges are waterproof when cemented to the wall. Two edges of each square have grooved projections and positioning slots. The adjacent squares fit into the grooves and a tongue locks in the slot for alignment. The tile is cemented to the wall with an adhesive paste. The squares are available in several colors, either plain or marbelized. They are nonabsorbent and can be washed.



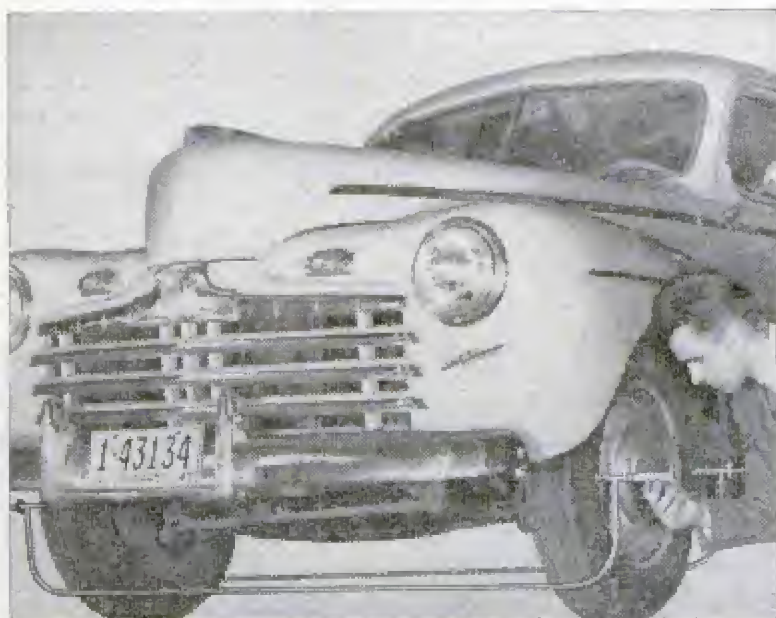


## Unit System for Home Cuts Building Costs

All dimensions of a small home built for exhibition in Washington, D. C., are multiples of four inches, a method that saves time in construction and prevents waste of materials by eliminating many problems of trimming to fit. Called "modular coordination," the method uses a four-inch "module" as a pattern for all materials in the house. Much of the material can be precut to fit the four-inch pattern. The exhibition house has four rooms and is made of plywood on a standard frame. The plywood is covered with building paper and wood siding.



Top view shows finished home with all dimensions in multiples of four inches, saving time and cost in trimming materials. Above, wood siding is installed over a shell made of plywood



## Gauge Measures Toe-In From Outside of Tires

Measuring toe-in of the front wheels from the outside walls of the tires, a new gauge eliminates the need of crawling under the car. The gauge has a micrometer-type scale and built-in spirit level that make accurate positioning simple. According to the manufacturer, the average operator can measure toe-in on any car or truck in less than two minutes.

Ⓢ Radiant-heating pipes warm stretches of highway in Belmont, Mass., and Klamath Falls, Ore., to guard against ice formation.



# Setting the Stage for an "Ad"



By Arthur R. Railton

**I**T WOULD not surprise the harried photographers at the Kling Studios in Chicago to see a Diesel-drawn train stroll in the door one day to have its picture taken.

The work that goes on in an advertising art studio is a blend of Hollywood and Broadway on a slightly reduced scale. Southern beaches suddenly crystallize inside a studio whose windows are being peppered by a Chicago sleet storm; the resulting advertisement makes men yearn for the right kind of swimming trunks and a Florida vacation.

Then minutes later the prop men are tearing down the make-believe beach and a luxurious living room is taking its place. It is so complete that you want to step into the room and relax for an evening in a cavernous lounge chair, pick your favorite magazine from the table, play symphony or swing on the record-changer and tap your cigarette ashes into the ash tray.

But the realism lasts only a few minutes. Once the photographers have recorded the carefully laid scene, the room is rapidly dismantled and filed away. All this to convince you of the merits of a particular brand of furniture or carpeting.

Paintings, advertising layouts, billboards and photographs are produced



speedily but only after hours of careful planning in a modern advertising studio and Kling's is among the newest. According to Lee R. Blevins, a partner in the firm, it is the first building of its kind specially designed for commercial art work. Outside and inside, its clean, straight lines are both functional and beautiful. Along two sides, full-length studio windows let soft light into artists' workrooms on both floors.

Producing the modern advertisement is a complicated task and Kling's does the

Full-length windows along two sides of the Kling Studios admit natural light for the artists. Overhanging corners at both entrances provide unloading space for automobiles well protected from Chicago's storms







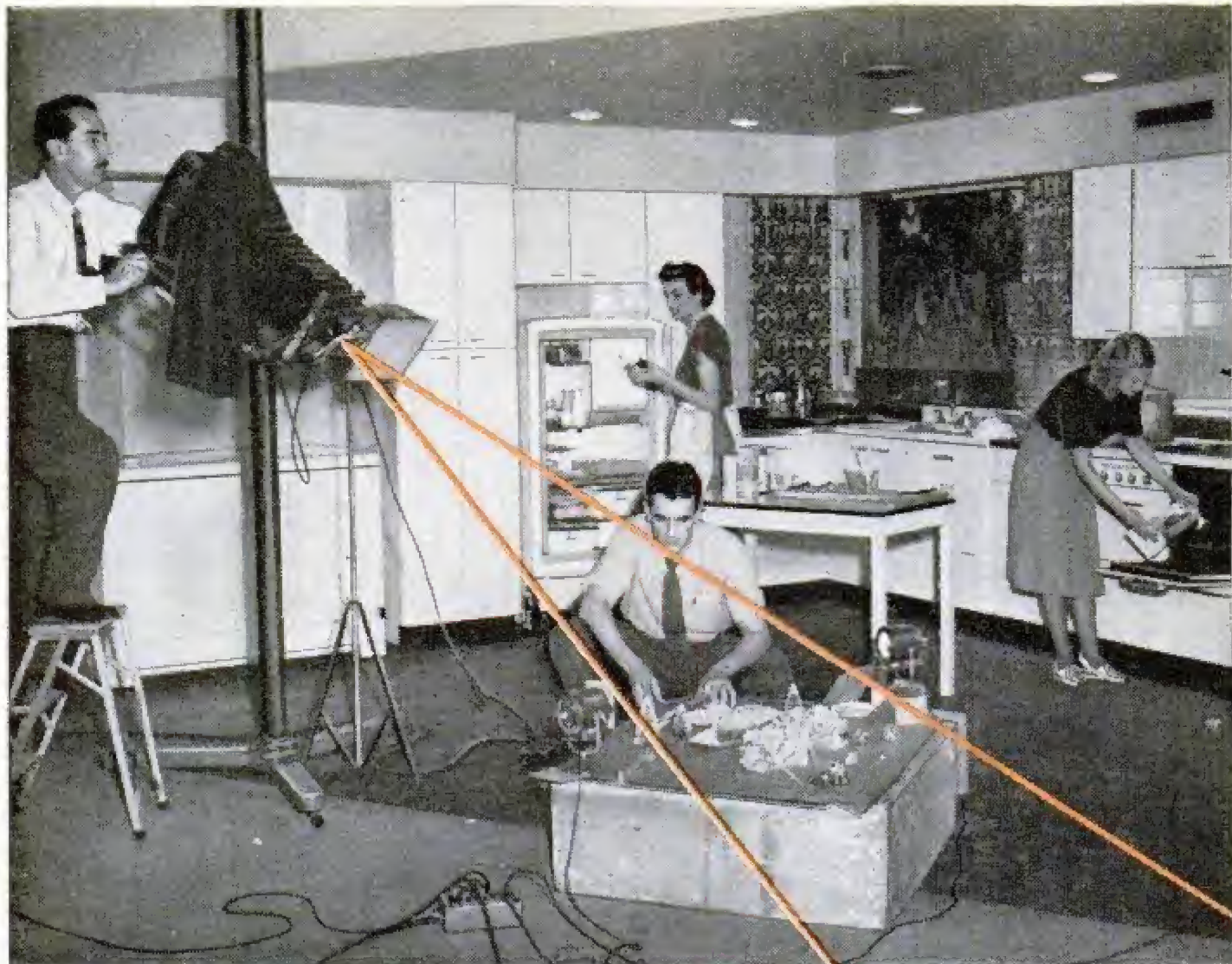
Prop men complete a set for a furniture advertisement as the art director (seated) checks the layout. Portion of woodworking shop shows at extreme right

For high-angle shots a 20-foot stepladder is used →

Modern lines of the reception room and its ramp to the second floor are beautiful and practical







It's only a few steps from the oven to the photograph in the modern kitchen used in preparing food for an advertising photo. Photographers "pose" a hot coffeecake before taking the picture shown on the next page

complete job from the rough layout to the finished photograph. Nearly 200 highly specialized men and women, varying in occupations from carpenters to expert color photographers and artists, combine their talents to produce many of the advertising photographs you see in *Popular Mechanics* and other national magazines.

Sets for these advertisements go up and down so fast that the studio changes its appearance almost hourly. Ready-made walls are stacked around the studio like books in a library. Doors and window frames of different shapes and sizes lean against the walls. A woodworking shop fills one corner of the building and, in a matter of minutes, the carpenters turn out necessary props with modern power tools.

When an advertisement calls for a luxurious bedroom, the prop men roll up three walls, doorframes and doors, windows and frames, clamp them together with heavy C-clamps and the room has taken shape.

Then the painters move in (using water-mix paint that is easily washed off when the job is finished), draperies are hung, pictures placed on the walls and the room

is ready for rugs and furniture. By the end of the day, the room has been photographed, the advertiser's furniture removed and the walls taken down. There is no evidence of the room's existence except as captured on the color film of the camera.

The carpenters work in a hobbyist's dream shop. Power tools, mounted on cast-er trucks, are rolled from set to set to speed preparation for the photographs. Lumber of various sizes is stacked behind the workshop and, on short notice, the woodworkers produce anything from a built-in bookcase to the observation platform of a streamliner.

After the set is taken down, the lumber is stored for use in the next photograph. One day a board might be part of a modern bathroom and the next day, repainted, it becomes a corner of a bombed-out building in Europe.

Prop girls and stylists have one of the most interesting and probably the most nerve-wracking jobs in the studio. They're sent out to track down any items necessary to furnish the set to perfection.

For example, one advertiser wanted to

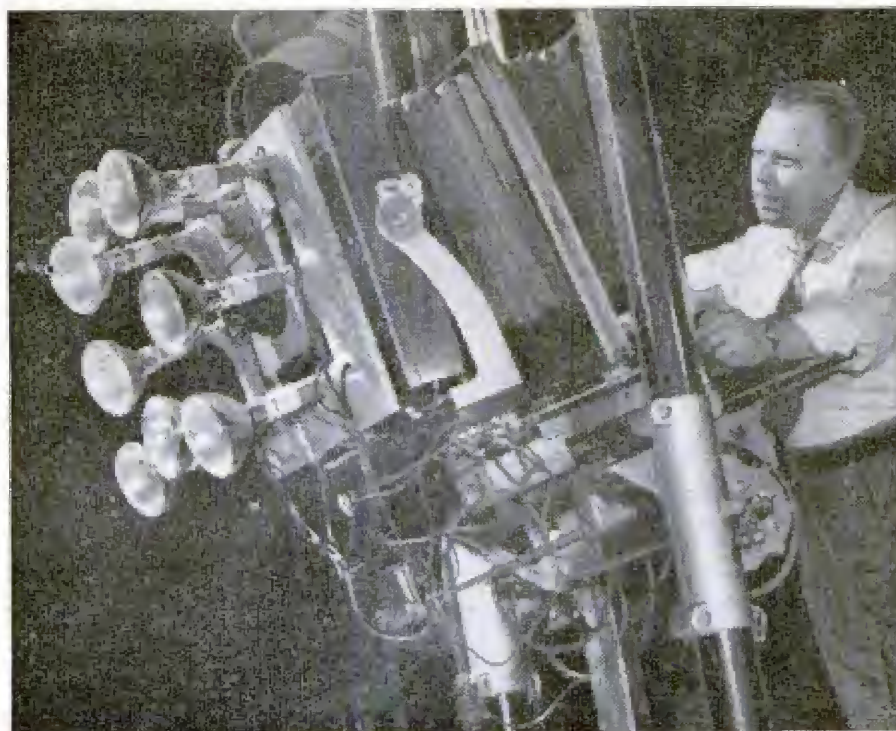


include a photograph of an old-fashioned kitchen in his layout. One item he required was an early model washing machine. The prop girls prowled for days through Chicago's second-hand stores. After a long search, they finally unearthed one in the attic of a private home. But it looked too old! In the advertisement it had to look like a new machine right from the factory. The mechanics went to work and in a few days it was ready to pose for its picture—gleaming under fresh varnish as bright as the day it left the store.

On the other end of the time scale are items that have to be brand new. When a flour miller wants a color photograph of hot rolls right out of the oven, that's the way they are photographed—right out of the oven. In Kling's own kitchen, adjacent to the studio, the food is prepared by expert home economists. The kitchen is as streamlined as the rest of the building and is complete with shining appliances that would make the average housewife sigh with envy.

Whether it's a batch of crisp cookies or

Here's the coffeecake as it looks in the advertisement. Taken from the oven seconds before it was photographed, the cake looks (and is) good enough to eat



No simple box camera, this huge studio camera, mounted on a heavy standard, is equipped with a battery of floodlights for shadowless lighting

a complete turkey dinner, Kling's expert cooks whip it up easily in the streamlined kitchen. Still steaming, the food is placed under bright lights and photographed.

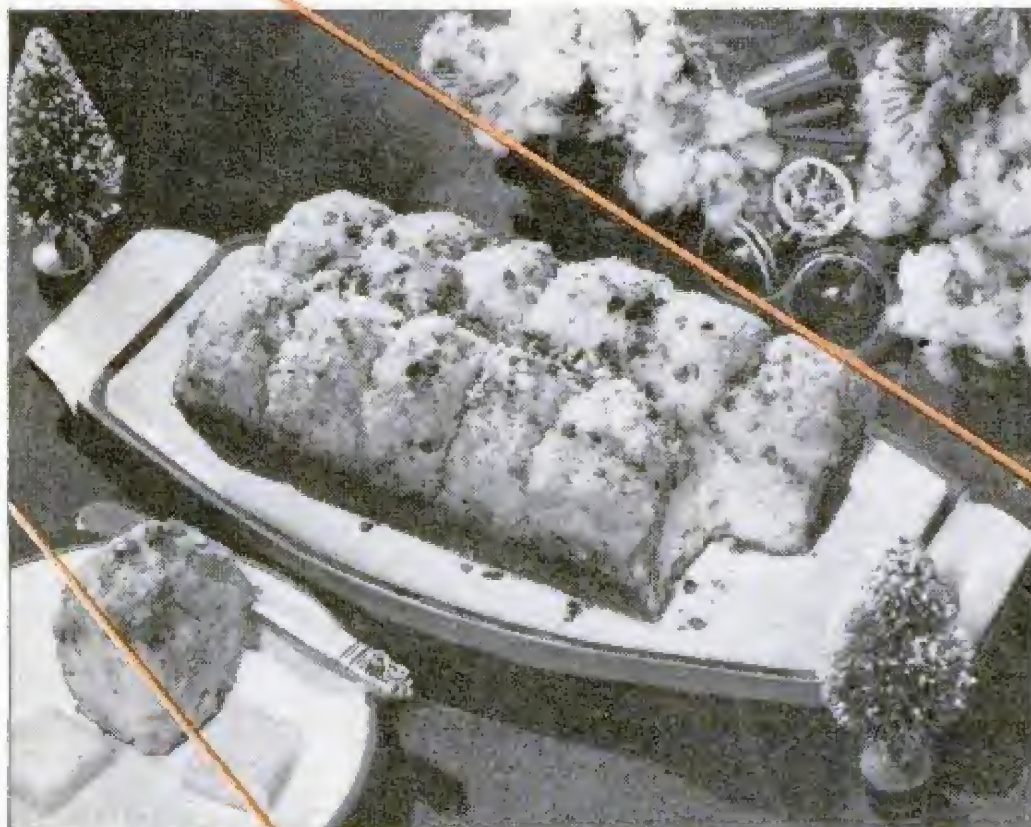
Such intensive preparation is necessary so the photographers can capture in life-like color the exact nature of the advertised product. Expert color photographers spend hours setting up the products, checking light reflections and shadows,

making the composition artistically perfect and, most important, showing off the items to best advantage.

Ten darkrooms, along an inside corridor, are used for developing and printing the pictures. As soon as the shutter clicks, the photographer's helper rushes into the developing room with a test negative to make sure everything is perfect before the final color shots are taken.

Today, the trend is to color and a great many of the thousands of shots taken at Kling's are in full, natural color. This requires more exact lighting and exposure and more complex processing, but at

(Continued to page 234)





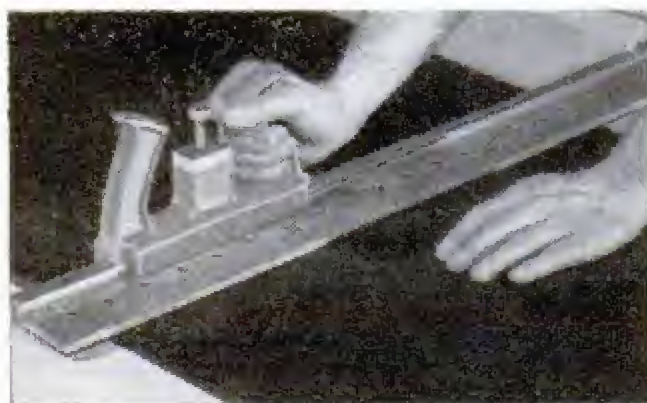


### Electric Shoeshiner

There's no excuse for dull shoes if you have an electric shoeshiner that buffs up a bright polish in seconds. Powered by a  $\frac{1}{20}$ -horsepower motor, the shiner has a circular chamois that can be removed for cleaning. Because of its low power, there is no danger to children in the whirling buffer. To shine shoes you apply polish with an attached dauber, hold your shoe lightly against the chamois and the motor does the rest.

### Wide-Belt Cutter

Belts up to 60 inches wide are cut quickly and without jagged edges by a combination cutter and guide. The V-shaped steel blade will cut belting up to  $1\frac{1}{8}$  inches thick. Each pass of the tool cuts  $\frac{1}{8}$  inch and adjustment of a thumbscrew lowers the blade for deeper cutting. The base is held stationary by nails or C-clamps.



### Paint Spreader for Screens

Consisting of thousands of hairs set in a slightly convex composition base, an applicator spreads paint on screens much faster than a brush. Equipped with a metal grip to fit the hand, it also serves for cleaning screens.

### Brief Case Serves as Desk

Busy executives can carry their desks with them when they have a leather traveling case with a warp-proof divider for use in letter writing. The top half of the case holds a partitioned brief case that can be removed and carried separately. The compact case can be held on the lap comfortably when used as a desk.

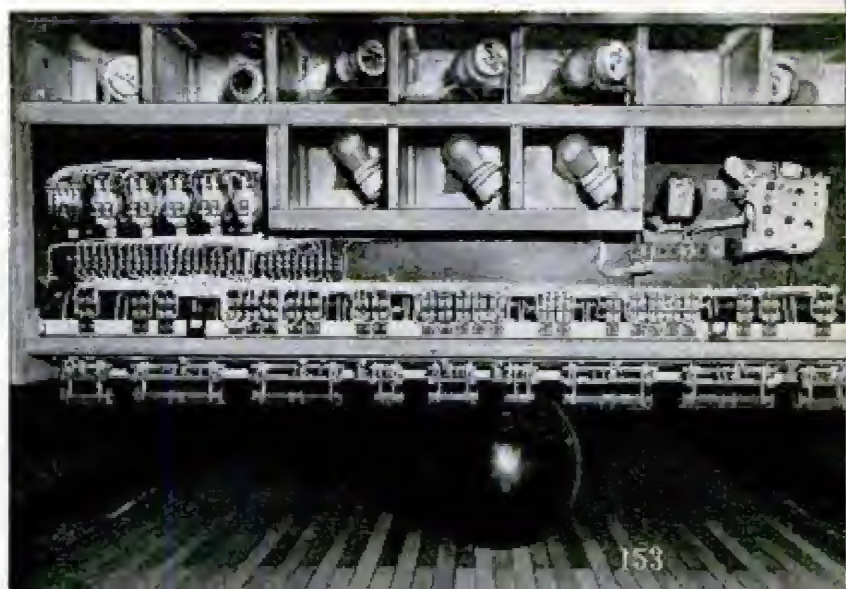






## PINLESS BOWLING

NEITHER pins nor pin boys figure in the full-size bowling game devised by Henry Leavitt of Ogden, Utah. Bowlers roll at a lighted target showing regulation-size pins in the usual positions, but suspended about a foot above the alley. The ball brushes against rollers wired to the pin lights as it speeds beneath the target. Depending on which combination of rollers the ball contacts, lights indicating the corresponding pins turn off. As nearly as possible, the electronically controlled machine is set to respond as pins do when the ball reaches specific points. Hits against either side of the head pin, for example, switch off all the lights to indicate a strike. After the ball thuds against the backstop, it is automatically hoisted to the return rail and sent on its way back to the user. Leavitt was inspired to build the machine by Louis P. Petersen, a Chicago bowling-alley operator plagued by the shortage of human pin setters. Synchronized with the machine will be sound equipment that reproduces bowling-alley noises, like the clatter of falling pins and the shouts of pin boys. The sounds will vary with the number of pins "hit." Later models of the machine will be coin-operated.



Top, bowler testing skill against Leavitt's pinless, boyless machine. Middle, ball brushing against rollers controlling lights for a 1-2 or "Brooklyn" strike. Bottom, same hit shown from rear of target. Bulbs illuminating 10 pin images are at the top





## Combat Glider Carries 30 Men

Surer landing control and a steel tube fuselage are two major features of the U. S. Air Force's newest combat glider, the XCG-18A Avitruc. The all-metal craft can carry 8000 pounds of cargo, 30 fully equipped troops or 24 litter patients. Landing accidents are minimized by use of a tricycle landing gear, providing safer ground control than was possible in wartime models. An extremely thin wing decreases drag so much that the glider has been towed aloft by a P-47 fighter in test flights. A rear cargo ramp leads into the hold, which is 24 feet long, 6 feet high and about 8 feet wide, facilitating movement



Chase Aircraft Co. photo

of bulky freight. There is a direct communication system between the glider and its tow plane. Its wingspan and length are 86 and 53 feet. The builder is designing a powered version for transport use.



## Fodder Drier

Grass is prepared for fodder by a mobile drying plant designed in England. The drier permits owners of small farms to process fodder on a cooperative basis. The plant can be erected within two hours. Diesel oil is burned to supply the heat and one tractor powers the plant. The grass is loaded on a turntable that revolves to expose the entire load to the burners. The plant, prepared for moving, makes a 34-foot "train."



## Push-Button Telegram Flashed to 143 Offices

Pressing one button flashes telegrams with vital flight information simultaneously to 143 United Air Lines offices throughout the United States. Each message is typed only once, at the point of origin, and the distribution pattern selected on a master push-button switching panel. After a start button is depressed, the message is automatically fed to designated receivers over the 15,000-mile network as quickly as the circuits are free. The feature was specially engineered by Western Union for the world's most extensive telegraph and private telephone system, handling more than 2,500,000 messages monthly.

## Use High-Frequency Radio To Take Pheasant Census

Relying on the male cock pheasant's habit of crowing only once in two minutes and loudly enough to be heard two miles, the North Dakota Game and Fish Department has evolved a new method for counting. Biologists in autos, with high-frequency radio receivers which pick up only the crows of pheasants, start the census 20 minutes before sunrise. Traveling for 1½ hours, they stop every two miles to record

the number of calls heard during a two-minute period. The tours are made during April, May and June. Results from the surveys are used in determining whether to open the season in various counties and in setting the bag limit.



## Midget Autopilot

Three gyros spinning 12,000 times a minute are the "brains" of a midget automatic pilot that reacts in  $\frac{1}{10}$  second. The 35-pound pilot isn't much larger than a box camera and is about half the ordinary size. Unlike other types, it is not affected by loop-the-loops, barrel rolls or great bursts of speed and may be used with radio control for pilotless planes and guided missiles. The gyros are "locked" to the plane during flight and follow it during all maneuvers without any possibility of tumbling. To dive or climb, the knob of the midget box is moved in or out; for turns, it is rotated right or left. In level flight, the pilot can sit back and relax while the plane flies itself. Although still in the experimental stage, it may be used for light commercial and private planes, as well as military craft.

Westinghouse photo.





Light stretcher dolly, above, designed at Yosemite to carry sick or injured. Loaded, it can easily be lifted over rocks and depressions by two men, where six were formerly required



Above, rangers using keyed horizon photos, made from lookout tower reporting, to determine actual location of fire. Below, carrying gasoline-operated pumping unit, hose and a two-way radio to scene of blaze. Water is drawn from closest source



**R**ANGER STATION?" asked the voice on the telephone. "There's a bear over here running around with its head stuck in a big milk can! Come and do something at once!"

The Yosemite Park ranger who hurried over really did find a bear with its head in a can, only by then the animal was on the verge of collapse from lack of air.

First the ranger shot a hole in the can, so the bear could breathe, and then the animal was roped and led over to a nearby machine shop. There a mechanic cut the can open. Unharmcd, the bear appeared to shrug its shoulders and shambled off into the brush.

The bears that frequent a number of our national parks do no harm, as long as they are left alone, but vacationists who attempt to feed or tease them are occasionally badly clawed or bitten. Sometimes





a bear makes a nuisance of himself by hanging around a camp in search of food. When this happens at Yosemite, the rangers haul out their mobile bear trap, a length of corrugated steel culvert pipe mounted on wheels. At-

tracted by food inside, the bear enters the trap and a steel door slams down behind him. Then the rangers tow the trap far out into the woods and release the animal.

Protecting the public from the bears and the bears from the public are among the incidental jobs that keep rangers of the National Park Service busy. Every summer millions of Americans, soft from city living, take their vacations in the national parks that are located in the most scenic, and rugged, parts of the country. Inevitably a number of them get lost, fall

**Uncle Sam's caretakers  
run a 24-hour service in  
protecting people from  
animals, and vice versa**

off horses or down mountain sides, slip on glaciers, tumble into streams and lakes, or even, in the midst of the wilderness, have automobile accidents.

Three hundred permanent rangers administer our 28 national

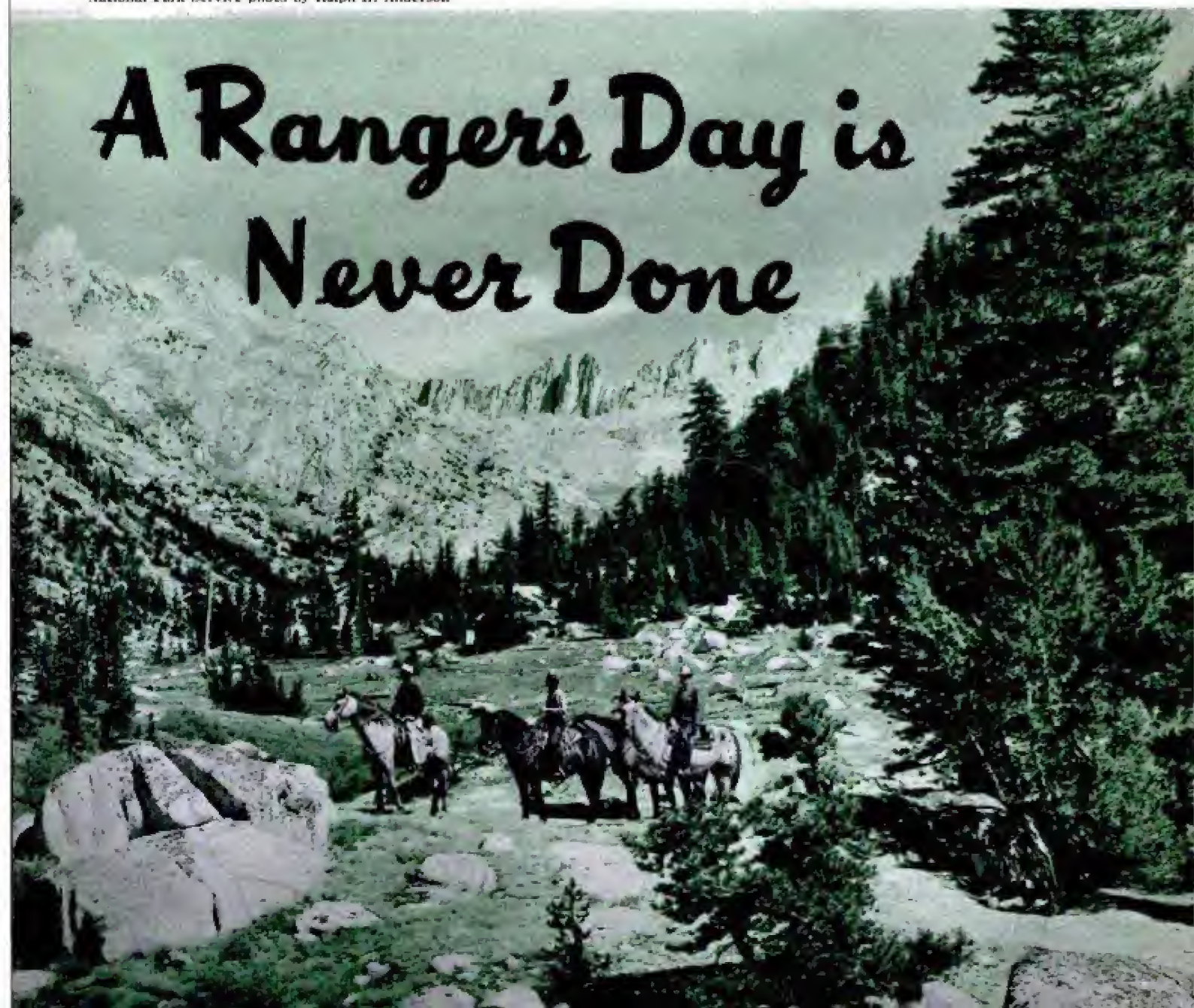
parks and 85 national monuments. During the tourist season this staff is augmented by 500 temporary rangers who are given short, intensive training courses. College students and school teachers often serve as temporary rangers.

Briefly, their job is to protect the vacationists from harm and at the same time preserve the natural features, wildlife and property of the park from damage or molestation. This breaks down into dozens of duties, ranging from directing traffic to planting fish and from trail building to

With a pack animal hauling their food, three rangers patrol trails just under timber line in the Yosemite high country. There are 300 of these highly trained woodsmen on full-time duty in the National Park Service

National Park Service photo by Ralph H. Anderson

# A Ranger's Day is Never Done







Close-up of the plow shown at left. It clears way for a growing army of skiers

National Park Service photos  
 Above, digging out at Lassen Volcanic National Park, where roads are sometimes buried 30 feet deep in snowdrifts. Below, the oddly shaped hummocks on this Yosemite glacier are caused by reflection of the sun's rays from sides of the water channels

forest-insect control. The rangers supervise the camp grounds, pack in supplies to lookout stations, take an annual game census, and give illustrated talks and campfire lectures. They patrol the trails, organize search and rescue parties, and fight forest fires. Depending on its location, a park may have up to 150 forest fires a year, most of which are caused by lightning and each of which must be put out as soon as possible.



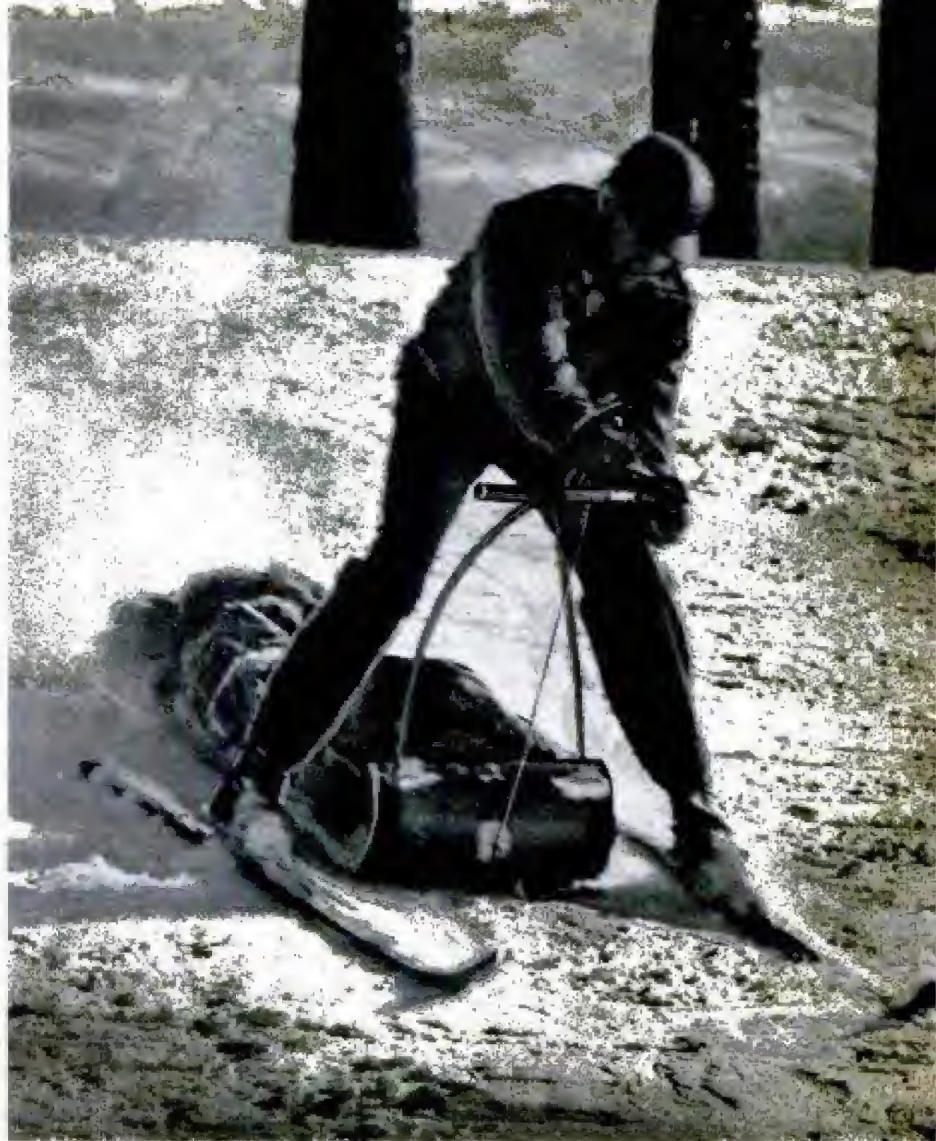


At any of the larger and more heavily visited parks the rangers can expect that several people will be killed by accident or drowning each season in spite of all the safety precautions that are taken. They can anticipate an average of one cliff rescue per year and four or five organized man-hunts. They can expect that 125 or so vacationists will need first aid for sprains or broken bones. At each of the parks the rangers maintain an emergency headquarters at which all sorts of rescue gear is stored and kept ready for immediate use.

Chief Park Ranger Oscar Sedergren of Yosemite, for instance, has an emergency storeroom in which are kept diving helmets, life rings, ropes and irons for mountain climbing, stretchers, blankets, flashlights and spare batteries, and emergency rations. Complete camping outfits made up into back packs stand ready to be picked up in a hurry. Walkie-talkie radios, portable power pumps, and fire-fighting equipment are kept serviced and ready to go. Recently added to the emergency equipment is a trail buggy developed at Yosemite on which one or two men may transport an injured person across rough ground or along trails in comfort.

The trail buggy consists of a light two-wheeled cart that weighs only a few pounds and a wire stretcher that fits on top. In the past an injured person often had to be transported on horseback or by a hand-held stretcher that was tiring and awkward to use.

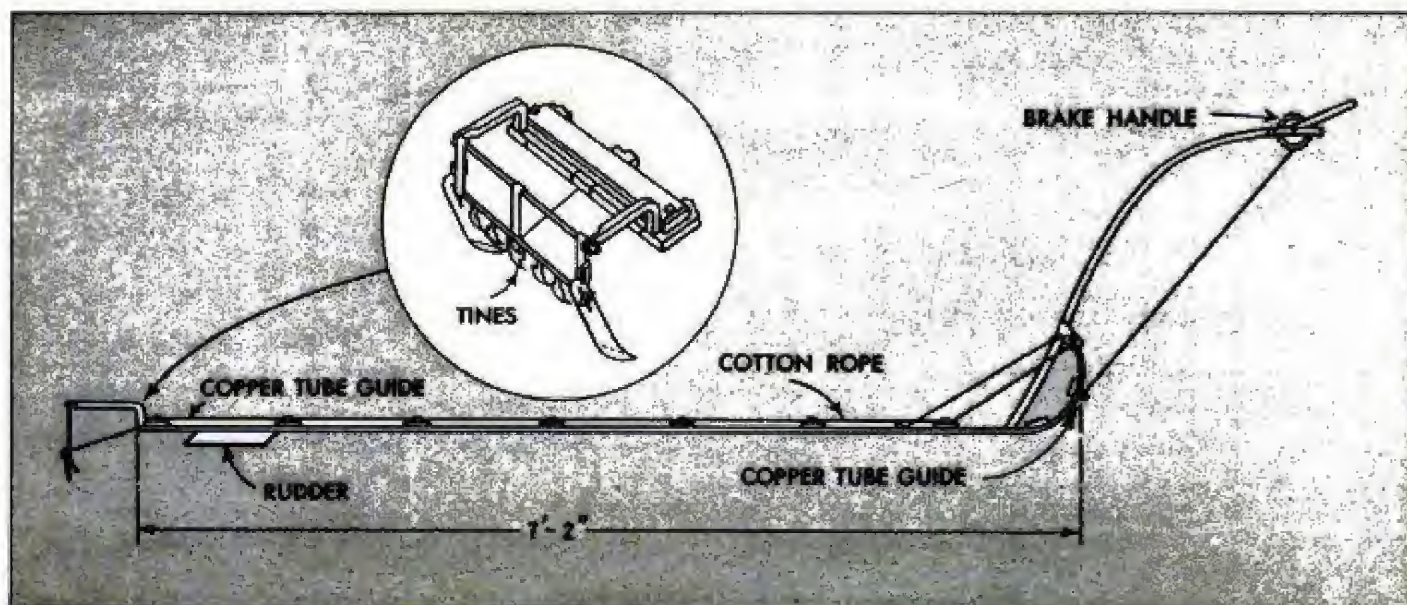
Years ago the national parks entertained very few winter visitors. Now, with the



Snow flies from the rear of rescue toboggan as a ranger pulls the brake handle (see sketch below). He uses his skis to steer

increasing popularity of snow sports a number of the parks are busy most of the year around. Highways into the ski regions are kept open in answer to the demand. Ski accidents are bound to occur, and the rangers and park mechanics have devised some ingenious rescue equipment.

A toboggan makes a good vehicle for carrying an injured skier downhill to a







Seining trout from dammed stream, for use as spawning stock in fish hatchery, is another ranger responsibility

first-aid station or ambulance, but as many as six men with ropes used to be needed for guiding the sled. Now one ranger can do the same job, using a rescue toboggan that was developed at Yosemite. The improved sled has a V-frame in front that rises up to form a handle. To the handle is attached a ratchet that is connected to a rake-type snow brake at the rear of the sled. A ranger simply straddles the handle and holds onto it while sliding downhill, using his own skis for steering. He brakes to slow speed, or stops completely by turning the ratchet handle with one hand.

Once the alertness of a ranger at Mount Rainier National Park saved the lives of two skiers buried under a snow slide. Making his way along a trail, the ranger noticed that a number of ski tracks came to an end at a point where a fresh slide covered the trail. Since no fresh tracks were visible on the other side of the slide, the ranger went for help at once.

The rescue party probed the slide area with 12-foot lengths of aluminum tubing and shortly an object was located at a depth of eight feet. Digging down, the rangers uncovered an unconscious skier. They revived him as rapidly as possible and learned that there were two other people in the group, both of whom had been behind him. With this information the rangers were able to locate the other two, one of whom was still alive. The men had been buried for four hours.

Ranger Ben Miller of Glacier National Park was caught by a snow slide while on

lonely winter patrol and carried 200 feet down the side of a mountain. He was buried in snow that was compacted almost as solidly as ice, yet a day later he managed to escape. One of the things that saved him was that he could reach up with his arms and open up a breathing hole, another was that he kept his wits with him all through his imprisonment.

His back pack was wedged in the snow so firmly that he could hardly move and his snowshoes had twisted so that he couldn't release his feet. It took Miller 24 hours of slow, patient clawing with his hands to get his pack off his back. Inside the pack was his hand ax and with this he hacked away enough snow from around his legs to release them from the snowshoes. He got loose with only a few sprains and frostbites and made his way home.

Behind the scenes at any busy national park is an organization comparable to that of a small city. All sorts of facilities and services must be available for its visitors. The result is that there are thousands of summer jobs for young men and women of around college age at such scenic spots as Yellowstone, Yosemite and the Grand Teton. The summer employees work in hotels and gas stations and devote their free time to mountain climbing, fishing and all the other activities of the out of doors.

Some of them are employed by the National Park Service itself, but most of the jobs are with the private companies that operate the resorts in the parks. At Yosemite, for instance, the Yosemite Park and





Setting trigger of a mobile bear trap. Steel panel slams down after animal moves in to take food bait

Curry Company is the licensee in charge of the hotels, restaurants, warehouses, laundries, barber shops, stores, bus transportation and a variety of other facilities.

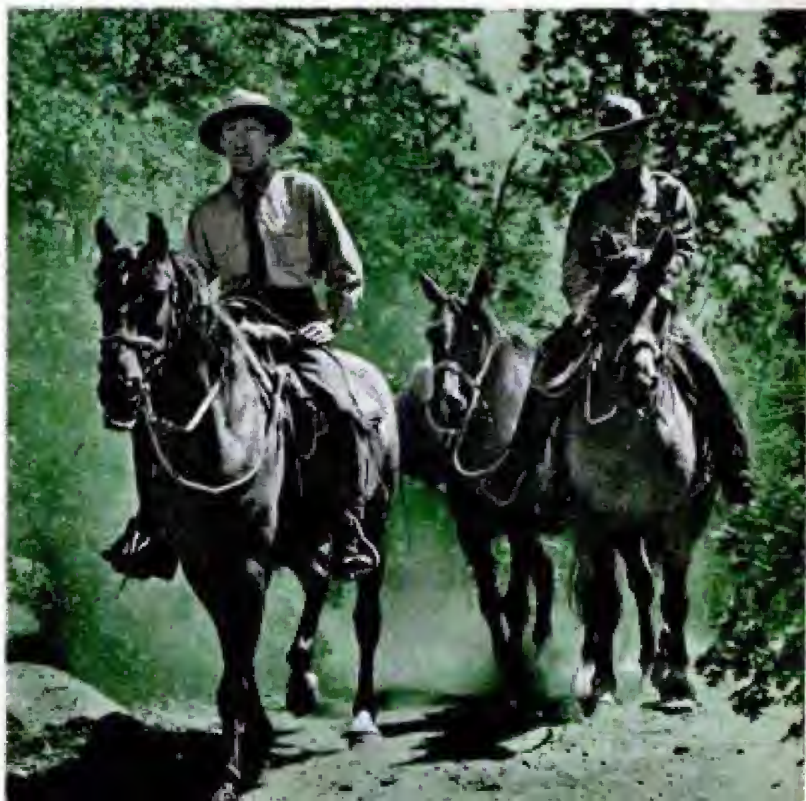
Beginning in May, or as soon as accepted applicants finish their school terms, the Yosemite concessioner employs about 1000 extra people for the summer season. Some of the jobs require previous experience, others can be handled with a minimum amount of training.

Warehouse workers earn a dollar an hour, dishwashers get \$140 a month plus meals, waitresses average \$10 a day plus meals, and other jobs are paid on appropriate scales. The employees receive reduced rates for meals and laundry service and they pay less than half a dollar per day for dormitory tents. They put in a 48-hour week and contract to work all through the season to Labor Day or later.

Yellowstone employs twice as many people as does Yosemite. Other parks that draw fewer visitors employ only a few score or a few hundred extra people during the summer. To learn more about summer job opportunities you should address a letter to the superintendent of the park you have in mind and ask the name of the principal concessioner. You can then send a letter to the concessioner company, describe your capabilities and background, and ask about the chances of employment. Policies vary with the different companies, although all are receptive to school and college students.



Bears are curious, too. A park machine-shop worker finally had to saw away milk can into which this one stuck his head. Bullet hole at the bottom was put in to give him air. Below, rangers on a patrol



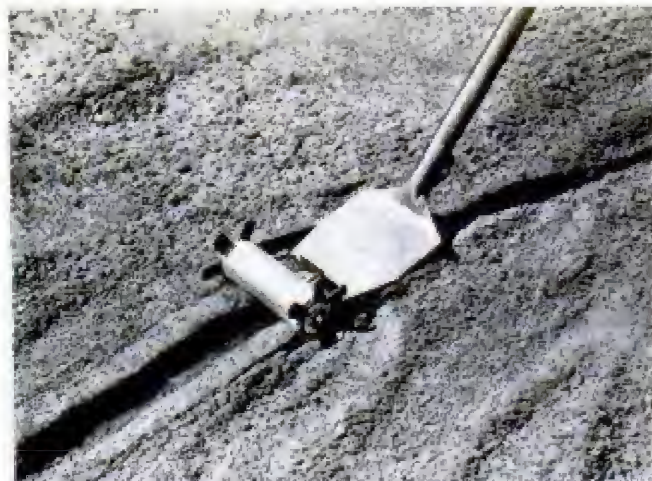




Du Pont Company photo

### Fire-Resistant Plane Paneling

Paneling that protects human flesh within one inch of a 2200-degree flame has been developed for airplanes. Called Pyroply, the  $\frac{1}{4}$ -inch-thick panels consist of cellulose-acetate plastic sandwiched between very thin sheets of carbon steel. On exposure to heat, the plastic forms parchmentlike layers that act as a barrier. The panels weigh less than a pound per square foot, yet are strong enough to support a large man.



### Garden Tool Cuts Even Furrows

Furrows of uniform depth are cut and covered by a garden tool that assures even planting. The tool, which has a four-foot handle, is pulled along the surface of the ground. The cutting plate between the blade and the roller can be adjusted to make a furrow of the desired depth. After the furrow is cut and the seed planted, the tool is turned over and pulled back along the same path to roll the soil smooth.

### Handle Keeps Paint Off Hands

Cans of paint can be held by a removable handle to avoid coating the hands. The handle also serves as a brush holder and scraper, and the tip can be used to open the paint can. Three projections hold the handle in place, two under the inner rim and one on the outside of the can. When not in use, the brush can be rested on the scraper blade so that excess paint on the rim of the can does not coat the brush handle. The blade provides a convenient surface for wiping paint out of the bristles.

Information, including manufacturers' and distributors' names and addresses, concerning products described in this issue may be obtained by writing to Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11





### Midget Electric Car

Scooting down the streets of Tokyo is a midget electric car that was invented by a former Kamikaze pilot who never had the

opportunity to take a fatal dive. A 30-volt battery provides power and the little vehicle can hit 25 to 30 miles an hour for six hours without recharging the battery. The car sells for about \$2400.

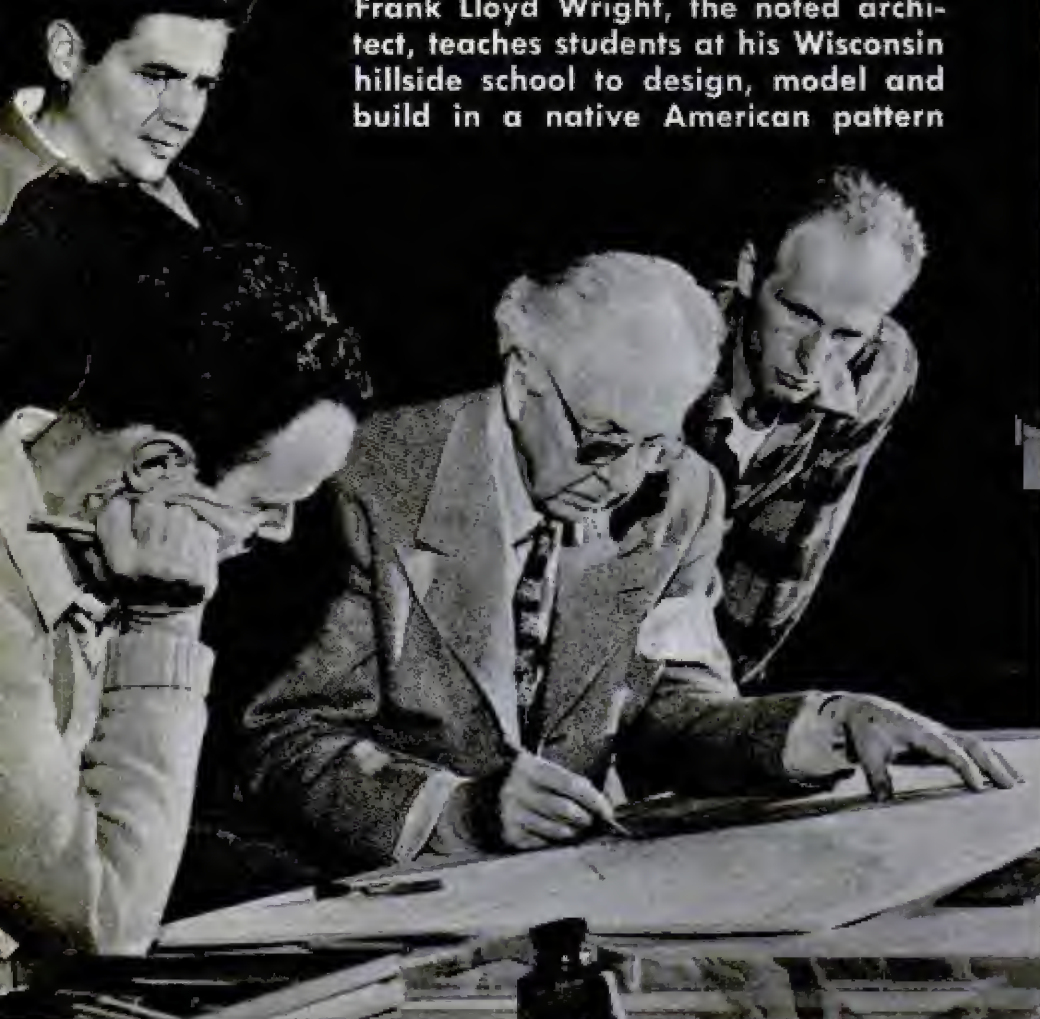


### Light Two-Place Helicopter

Exceptionally light weight and stability feature the twin-rotored JOV-3 helicopter being built in Philadelphia. The craft weighs only 1200 pounds, seats two tandem-

fashion and is driven by a small 100-horsepower engine. Its inventor claims it can make turns and land within a space its own size. Each rotor has three blades and is 18½ feet in diameter. The JOV-3 cruises 73 miles an hour and has a 138-mile range.





Frank Lloyd Wright, the noted architect, teaches students at his Wisconsin hillside school to design, model and build in a native American pattern



## Architecture From the Ground Up

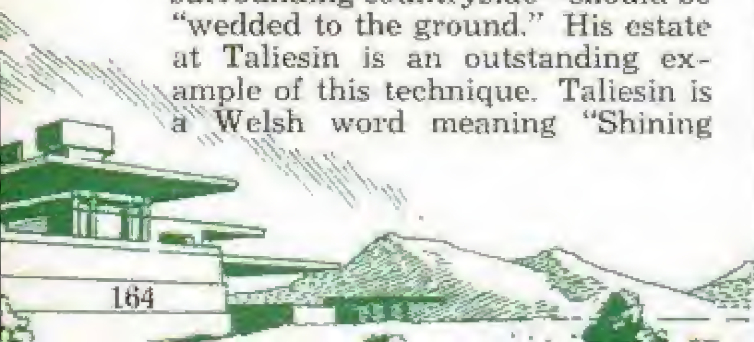
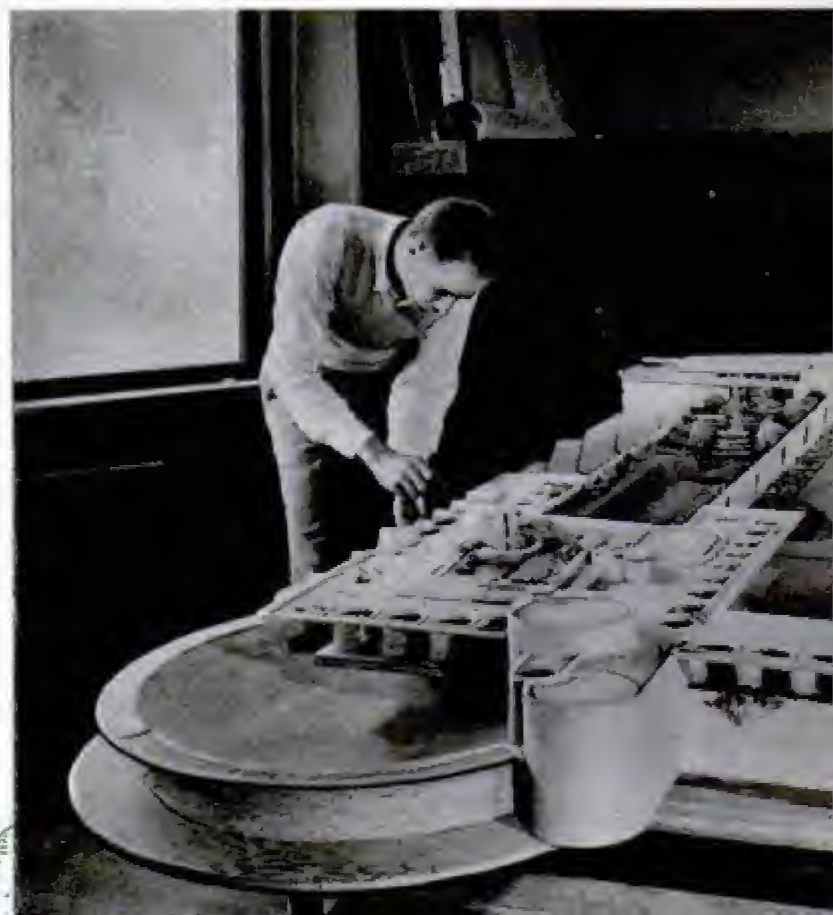
By Clifford B. Hicks

**F**RANK LLOYD WRIGHT believes that an architect is more than a designer. An architect is a builder to whom tools and materials should be old friends. To prove his idea, Wright not only is building world-famous structures but is building good architects.

At Taliesin, the noted architect's estate near Spring Green, Wis., Wright is the faculty of a unique school for architects. The 55 students in his school this year made their way to Taliesin from 15 different countries to learn his techniques.

Wright is the forthright exponent of a native American architecture. Homes, he says, should blend into the surrounding countryside—should be “wedded to the ground.” His estate at Taliesin is an outstanding example of this technique. Taliesin is a Welsh word meaning “Shining

Apprentice touches up model of an unusual home with circular pool. Water will splash over edge in a cylindrical waterfall







Students work in the vast drafting room they designed. Left, windmill tower which Wright built 50 years ago overlooks the school. Neighbors said it wouldn't weather the first storm

Brow." On a ridge overlooking the Wisconsin River stands Wright's home, a building that seems to grow out of the ground. The home and two older buildings in the valley below house the Taliesin Fellowship, the school which Wright hopes will turn out a generation of architects who are builders, not merely designers.

Standing like a symbol high on a hill overlooking the school is one of Wright's first architectural projects—a wooden windmill tower which neighbors said would topple in the first storm. It has lasted 50 years.

The school has no faculty other than Wright, no curriculum and no hourly courses. Wright believes that students "learn by doing." His apprentices learn architecture by working with Wright on his projects. They may remain at the school 10 days or 10 years, and when they leave they are given a letter of recommendation instead of a diploma, if their work has been satisfactory. Usually such a letter signed by Wright assures them of a good job or clients of their own.

Students feel that they are working under the guidance of the master architect. In the 50 years that Wright has been an architect of stature he has designed 500-odd homes and buildings, many of them so revolutionary that they have set a new style in architecture. His ideas are best expressed in his homes, which he designs "from the inside



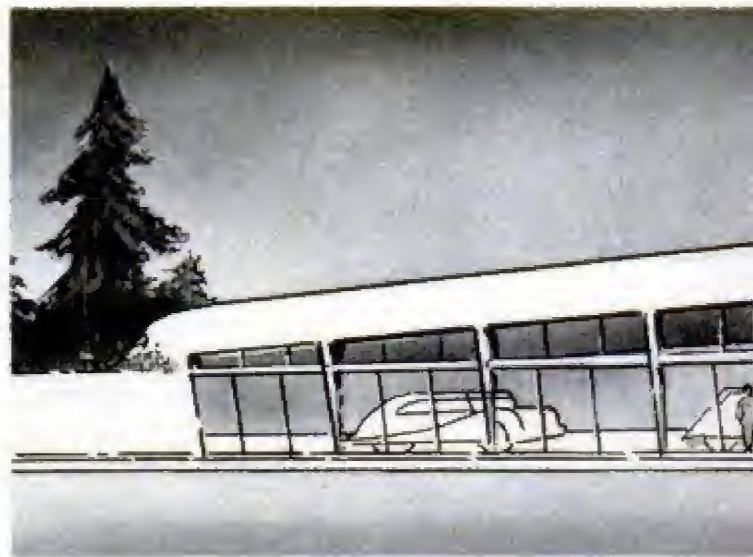




Daughter watches as mother-student weaves tapestry. Weaving is but one of the arts taught at Taliesin



Apprentices lay stone for new wing of school building. Wright believes students should "learn by doing" From workshop came famous models of Wright's buildings. Apprentices even carve each "stone" from wood



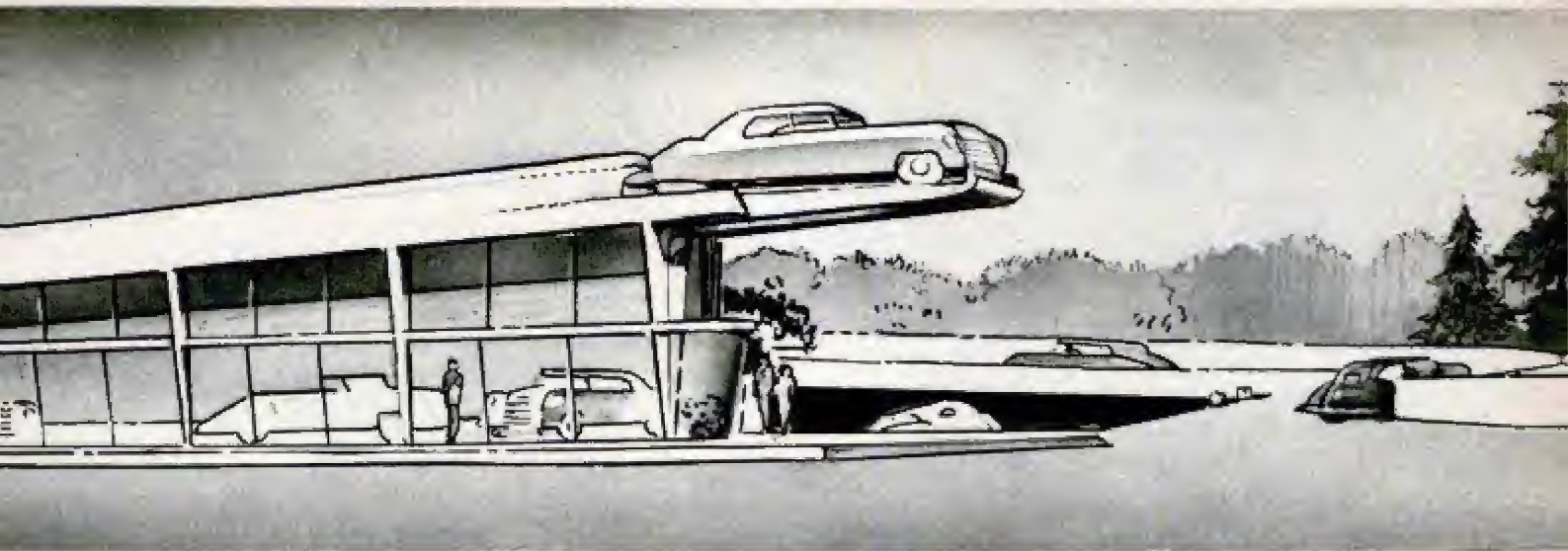
out." Most of his houses are spacious and low-slung with broad roofs, big fireplaces and long horizontal lines. They usually are built of materials that will blend into the landscape, so that they seem a part of the setting. In his large city buildings, for which he is more famous, his idea is to tailor the structure to its purpose instead of designing a beautiful exterior and then splitting the inside into cubicles. The outside lines flow around the pattern set in the interior. The resulting buildings usually have such simplicity that they are startling.

One example is the research building now under construction for the makers of Johnson's Wax in Racine, Wis. The structure will be 15 stories high with circular walls of tubular glass. Alternating with the main floors will be circular floors inside the walls. The entire building will be supported by a circular masonry stem extending 50 feet into the ground. According to Wright, the building will be flooded with light and will house the research offices in natural relationship flowing downward.

These are among the many ideas that apprentices at his school are absorbing. The Taliesin Fellowship was founded in 1932 to include the young draftsmen who were working with Wright on his projects. A few of the original apprentices work with him today, serving as advisers for other students. Others have made brilliant careers in architecture. The Foundation has grown slowly through the years and taken on an international flavor with the addition of students from foreign countries. Today apprentices from Japan and Palestine are working with T-square and triangle beside young men from China and Egypt. Among the other countries represented are Norway, Ceylon, India and England.

Because the 79-year-old architect believes that a man cannot design a good building unless he knows the nature of the materials from which it will be built.





Among Wright's latest designs is garage-salesroom to be built in Detroit. Real car will be exhibited on ramp

Wright insists that his apprentices build with their own hands. All the buildings of the school have been built or rebuilt by the apprentices. Under the guidance of old Welsh stonemasons, the apprentices chip stone, select faces, patiently fit walls together and bind them with mortar.

The young men cut lumber for their buildings from the native growth around Taliesin, supervise the milling of it, and erect it themselves. After years of such patient work, according to Wright, students and materials will work together as a team in building new structures.

Brand new building materials are under study at Taliesin, too. Metal and plastics are receiving attention, and there are big triangular glass panes lying about the

buildings. They will form the walls of the 47-story glass hotel which Wright has designed to be built in Dallas. Most of the panes will be insulated with glass fiber, and colorful bundles of the wool-like material are strewn about Wright's personal studio.

The hotel design is revolutionary in itself. The structure will be built of glass, magnesium and stainless steel and will be stronger than reinforced concrete, according to Wright. Every room will be an outside room reached by interior sun galleries. Each row of glass panes will project slightly at the top and slant inward toward the bottom, giving the effect of overlapping stories. Wright says the walls will be self-cleaning and impervious to hail because of the inward slant.

Students translated Wright's ideas of ideal community into model complete with "acre of ground for each home"







**Old buildings at Taliesin were redesigned by apprentices. Then they did back-breaking stonework themselves**

Apprentices start designing and drafting the day they enter the Fellowship. Whenever a man is assigned a room, he rebuilds it according to his own tastes and requirements. The resulting arrangements are unique. The apprentice actually must live with his own design, and the mistakes he makes he never forgets. You can't forget a mistake that greets you every day.

Several hours are set aside each afternoon for work on the projects Wright has undertaken. This is essentially a drafting job, as Wright himself works out the idea of the building and draws a floor plan and elevation, whether it's a five-room home or a 50-story hotel. But the apprentice

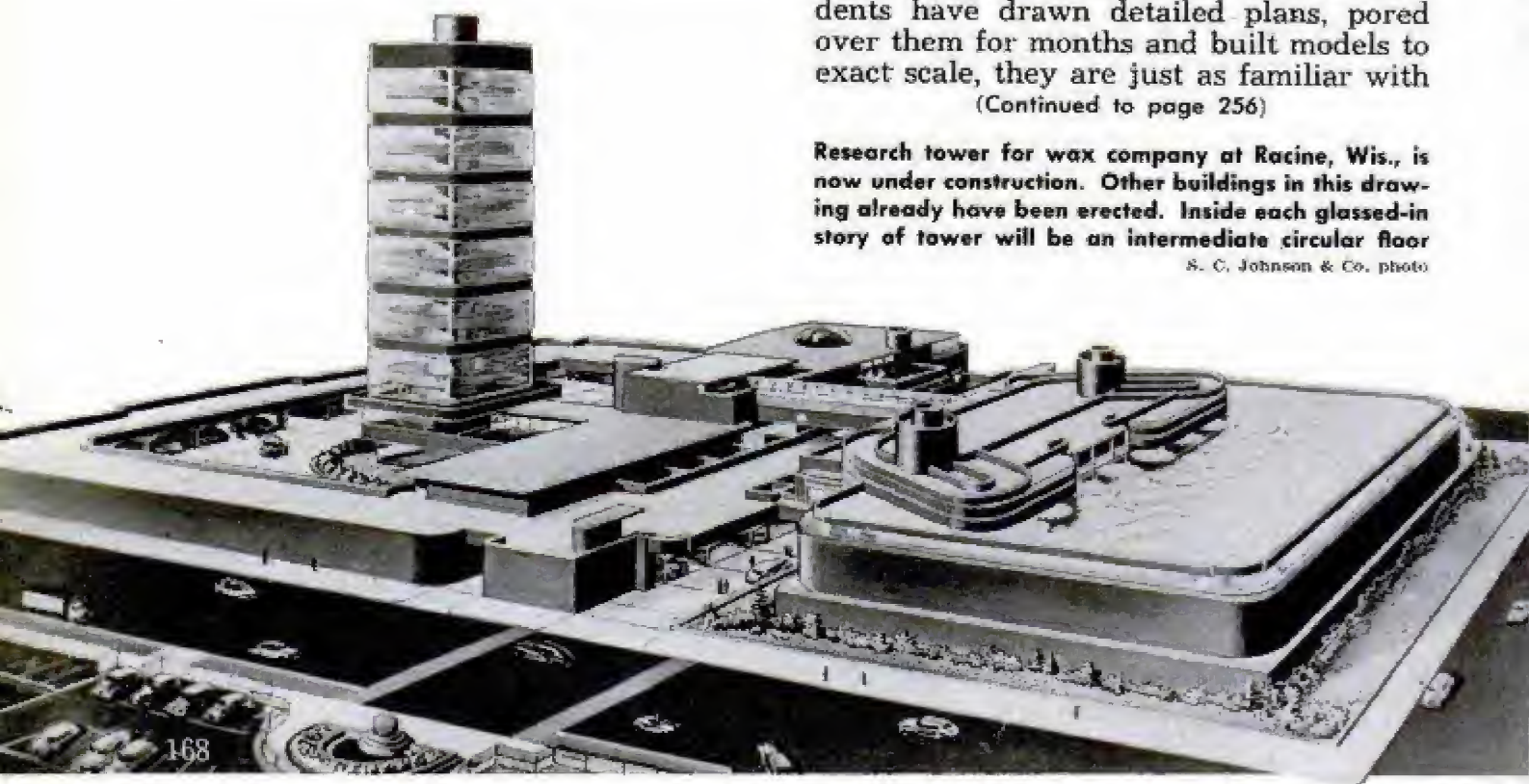
takes over the job of making detailed drawings of the building, and here he expresses his own originality, both in conception and drawing. Wright describes his apprentices as "the fingers of my hands." The final drawings of some of the buildings are so well done that they are considered works of art and have been exhibited throughout the country. A few have been done by men with no drafting experience before they came to Taliesin. In fact, a majority of Wright's students have had no previous training in architecture.

In the now-famous workshop of the Fellowship the apprentices carry through another phase of their training, patiently fashioning scale models of the buildings Wright has planned. By the time the students have drawn detailed plans, pored over them for months and built models to exact scale, they are just as familiar with

(Continued to page 256)

**Research tower for wax company at Racine, Wis., is now under construction. Other buildings in this drawing already have been erected. Inside each glassed-in story of tower will be an intermediate circular floor**

S. C. Johnson & Co. photo



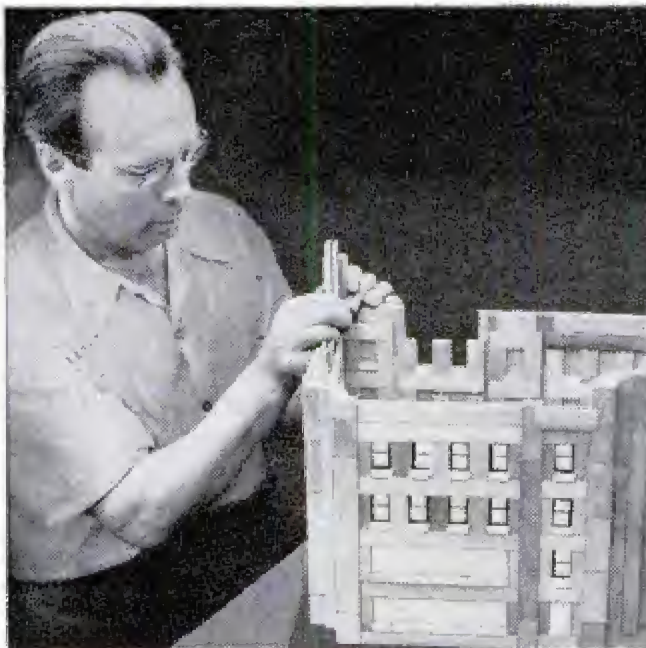




### Cruising Telegraph Office Picks Up Messages by Radio

Telegrams are received and delivered by a telegraph office on wheels—a car equipped with machines for recording radio messages. Recently tested in Baltimore, the car cruised through an assigned residential district, offering speedy delivery of messages picked up over its ultra-short-wave radio system. Telegrams addressed to residents in the area were

received at the central Baltimore office and then broadcast to the car. Inside the car a recorder picked up the messages and printed a facsimile. The driver merely made the delivery at the address on the telegram. Replies and telegrams that he picked up were transmitted by radio to the Western Union office where they were flashed to the proper destination.



### Aluminum Blocks for Scale Models

Scale models of buildings ranging from a tiny cottage to a model of the Empire State Building can be built with interlocking building blocks made of aluminum. Designed to permit reproduction on a scale of  $\frac{1}{4}$  inch to the foot, the blocks are available in 19 colors. Only five shapes of blocks are needed and they can be used over and over. In the model of the Empire State Building, 16,000 blocks were used, 4700 of them being used as windows.



Towering above its builders, this realistic model of the Empire State Building contains 16,000 blocks





After making it safe by de-fusing, Army engineers recover an unexploded Japanese bomb on a Pacific island

By Andrew Hamilton

## Pulling the Fangs of War



IN THE DIM LIGHT of dawn, fisherman Jose Gonzales couldn't see the wicked-looking Japanese horned mine that floated in front of his tiny boat as he left Manila Bay. He never knew what blew his boat to kindling wood—he never knew because he was killed instantly.

Death also came suddenly to an 11-year-old boy in Kansas as he played with a bazooka shell. "Hey, look, I'm a bazooka gunner," he shouted to two playmates as he slammed the projectile on the sidewalk. It exploded with a blinding flash killing him instantly and injuring his playmates so severely they died in the hospital.

A Sunday picnic on a Normandy beach was almost fatal to an entire French family of four. They stepped on a live land mine hidden in the sand. The explosion sent all four to the hospital.

People are still being killed and injured by World War II ammunition. It took almost 15 years to sweep the water and clear the battlefields of Europe after World War I; it may take even longer to pull the fangs of World War II.

Here in the United States we are lucky



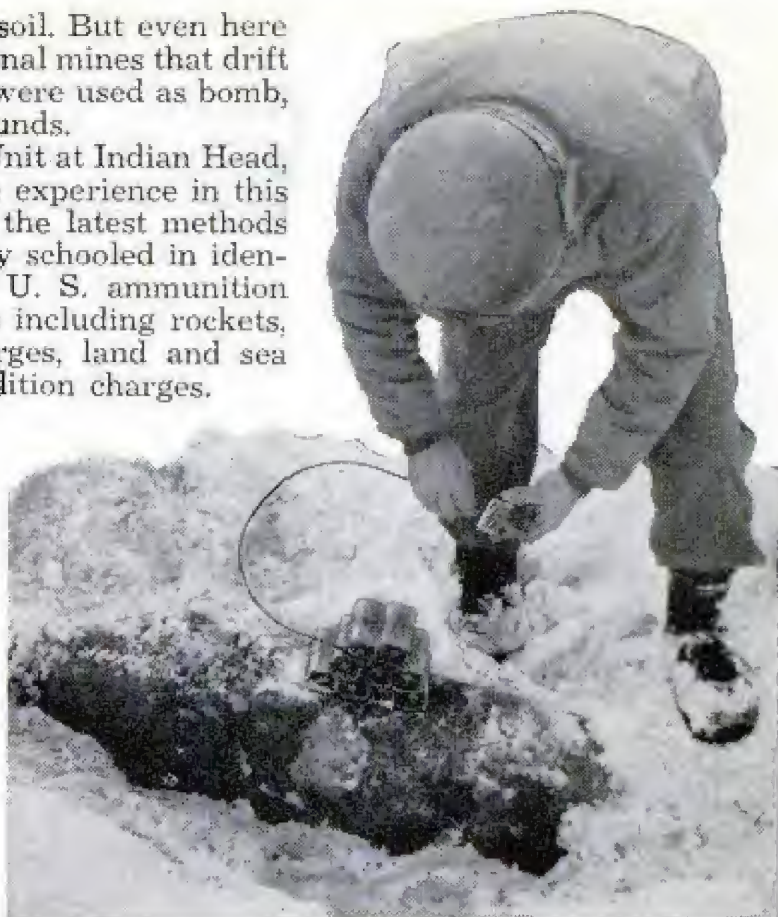
that no battles were fought on our soil. But even here death lurks in war souvenirs, occasional mines that drift onto our beaches, and in areas that were used as bomb, artillery and infantry-training grounds.

At the Naval Ordnance Disposal Unit at Indian Head, Md., officers who have had wartime experience in this work are given further training in the latest methods of bomb disposal. They are carefully schooled in identifying, handling and disposing of U. S. ammunition as well as all known foreign makes including rockets, torpedoes, booby traps, depth charges, land and sea mines, projectiles, bombs and demolition charges.

These Navy-trained "bomb busters" have answered several hundred calls for help ranging from de-fusing a souvenir mortar shell to cleaning up 1900 rounds of live ammunition scattered by the explosion of the destroyer USS Solar at the Naval Ammunition Depot, Earle, N. J.

Coastguardsmen on Nantucket Island, Mass., found two spherical mines that had washed up on the beach approximately five miles apart. A guard was posted on each mine and the information relayed to Washington. An ordnance disposal unit arrived by plane the next day and de-fused the mines.

At the Gulf Shipbuilding Co., Chickasaw, Ala., a fused bomb



In open country bombs are often exploded where they are found. Above, soldier places five half-pound blocks of TNT on a dud bomb. He holds a safety time fuse in his hands. Below, here's what happened when the bomb shown above was detonated







This barnacled mine drifted ashore. Navy officer removes its arming pin

was found in the hold of the decommissioned escort carrier, *Stalker*. A wire to Washington brought one of the Navy's top bomb busters to the scene. He removed the fuse and directed the removal of the death-dealing object, a 500-pound British bomb.

The next few years will bring more, not fewer, calls for the Navy demolition experts as time and weather working on mine moorings set more of them adrift. American and British mines are comparatively easy to disarm because their mechanisms are well known. Japanese and German mines often provide the additional hazards of booby traps.

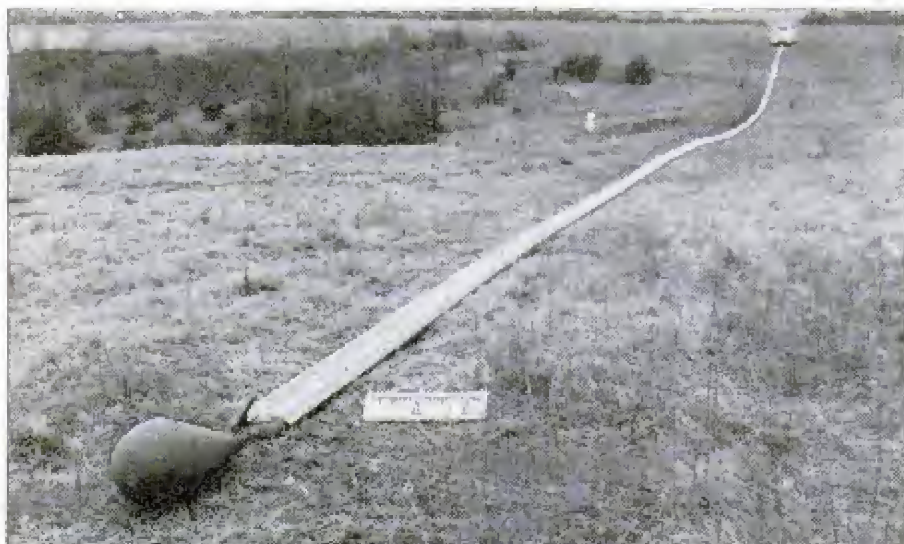
At the close of World War II, the U. S. Army's Corp of Engineers organized six Bomb and Shell Disposal Teams, each consisting of one officer and eight enlisted men. They scoured millions of acres of Army training areas in the United States ridding them of rockets, grenades, mortar shells and bombs that had failed to explode when fired. Although nearly 10,000,000 acres have been returned to public use, danger areas still exist.

The Southwestern Proving Ground at Hope, Ark., was built by the Army to test ammunition ranging from hand grenades to 2000-pound blockbusters. When the war ended duds were so thick there that you could hardly walk without stepping on them. The demolition teams went to work searching the area, flagging suspicious bombs and shells, blowing them up. In six weeks more than 300,000 potential death traps were destroyed.

Although accidents in



Above, huge signs such as this one on a California desert warn travelers that the fangs of war are still dangerous in the U.S. Below, the "Snake," a long trough pushed by a tank, contains explosives that blow up mines in the area. The football-like object in the foreground guides it over bumps





the United States have never approached the number in Europe, the increase has been alarming. Farmers, children and souvenir hunters frequently ignore signs posted by the Army in danger areas. Sometimes this has fatal results.

A more difficult phase of demolition work concerns the sites of munition plants. TNT, one of the most enduring chemical compounds, is not soluble. The process of manufacture, involving washes, contaminates the soil with explosives to an unknown depth. Sewer pipes have been found to contain as much as 18 inches of sudden death deposited by the wash water. Explosives have even infiltrated and permeated concrete.

Mechanical ingenuity has aided the bomb busters. The "Snake," for example, was the Army's clever device for clearing mine fields during hostilities. Pushed by a light or medium tank, the Snake consists of a 400-foot aluminum extension, 14 inches wide and 5 inches high. This long, flexible trough, filled with 4480 pounds of high explosive, was exploded by machine-gun fire. The detonation fired all mines within several yards and allowed tanks to roll through safely.

The Navy developed a 78-layer suit of pure Nylon worn by officers and men of the bomb-disposal squads. Hands are protected by heavy Nylon gloves and the face is shielded by a shatterproof-glass mask.

In Europe and the Far East, other nations are conducting a systematic campaign to free their fields and the sea of lurking death.

One disposal squadron of the British Army's



Steaming main charge out of a Japanese 500-pound high-explosive bomb



Above, 78-layer suit of pure Nylon protects this Navy bomb buster from any possible explosion as he disarms fuses. The mask he wears has a window of shatterproof glass. Below, rockets that failed to go off during a naval barrage of a Pacific-island beach are piled up and prepared for detonation







Above, Italian youth inspects two Nazi demolition bombs that failed to explode when bridge across river was blown up. New bridge is shown at right. Below, soldier prepares to unscrew the nose fuse of a bomb that the disposal crew has uncovered



Royal Engineers recently dug up the largest unexploded bomb found in England. Weighing 4000 pounds, the German bomb, called a "Satan," was buried 57 feet in the earth. The engineers dug a shaft 12 feet square down to the bomb, removed the fuse and hoisted the Satan out safely. Today it stands alongside the door to the squadron's mess hall looking dangerous but actually harmless now that it has been de-fused.

In Germany, former Nazi explosives experts are clearing the fields and roads of land mines, booby traps, unexploded bombs and shells. In the Rhineland the danger is especially great. During the war, for example, engineers of the 65th Infantry Division destroyed between 3000 and 4000 mines in a quarter-mile stretch.

Along the invasion coast of France all manner of devilish devices of Hitler's Atlantic Wall are being cleaned out. As Nazi troops retreated across the fields of Normandy, they left a thick sprinkling of underground land mines to slow the advance of the Allies. French livestock has helped the

(Continued to page 240)





## "Machine Shop" Operated by Tractor's Power Take-Off

Repairs to farm equipment can be made in the field with a "machine shop" that operates from a tractor's power take-off. The repair tools consist of a grinder, drill press, high-speed drills and a flexible shaft that takes many standard attachments. The

tools are mounted on the splined shaft of the take-off and permit sharpening or repairing equipment on the site without a trip to the tool shop. By using the flexible shaft, the farmer can sharpen implements without disassembling them.



Brunswick-Balke-Collender Co. photo

**BILLIARD SCORE INDICATORS** built into the outer edge of the table rail are replacing overhead string counters reminiscent of the game's gas-light era. The new counters are located near the corners and are turned by knurled knobs. It was one of the improvements first introduced at the Cue & Cushion recreation parlor in Springfield, Ill., where a campaign is underway to popularize the game with the younger crowd



## Venetians Stroll on Famed Canals With "Pneumatic" Water Skis



There's no miracle in the way residents of Venice walk on water. A Venetian barber has invented a pair of water skis that can be worn like shoes, enabling residents to walk on the waters of the city's famous canals. The skis are about the same size as snow skis but have an air chamber to give them buoyancy. Pedestrians keep their balance with the aid of poles.

### Coal-Made Plastic

Under high pressure, bituminous coal becomes plastic and can be molded into many shapes. Powdered coal is used and its temperature raised to about 345 degrees Centigrade. Best molding pressures are between 4500 and 6700 pounds per square inch. The product is glossy black and similar to glass in texture. It is used for manufacturing electrical insulators and storage containers for chemicals that are corrosive.

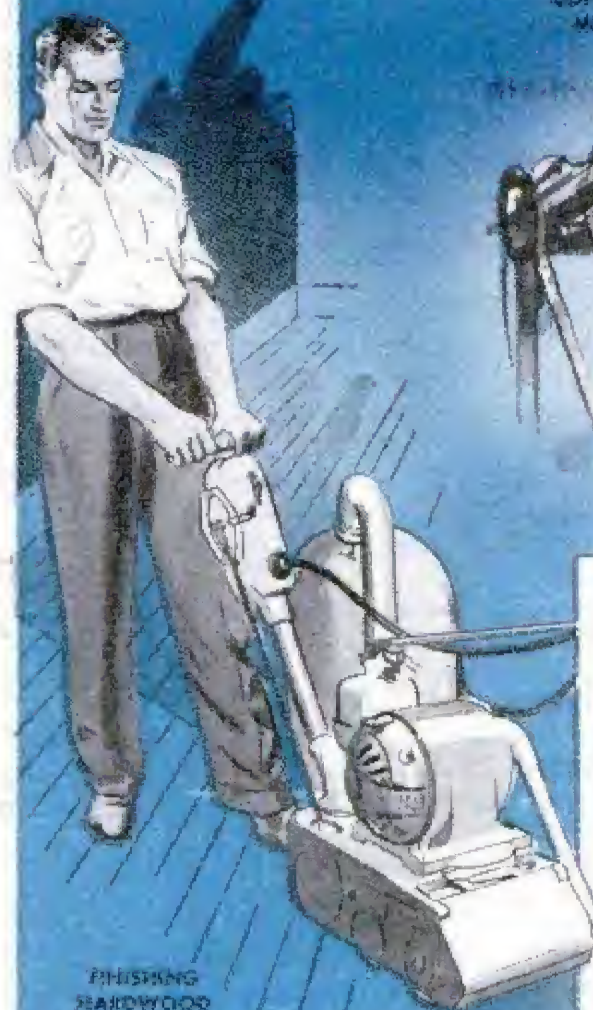
### Powerful Hand Magnet

Powered by two permanent magnets, a load-releasing magnetic separator and handler lifts up to 15 pounds of iron or steel. When a finger lever is raised, the magnetic force is cut off and the load is released. No wires or batteries are needed as permanent magnets are used. The manufacturer states that the separator will not lose its strength no matter how long it is used. It is especially useful in handling nuts, bolts and nails, and in separating ferrous from nonferrous materials.

Information, including manufacturers' names and addresses, concerning products described in this issue may be obtained by writing to Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Illinois







FINISHING  
SANDWOOD  
FLOORS.



CONCRETE  
MIXER

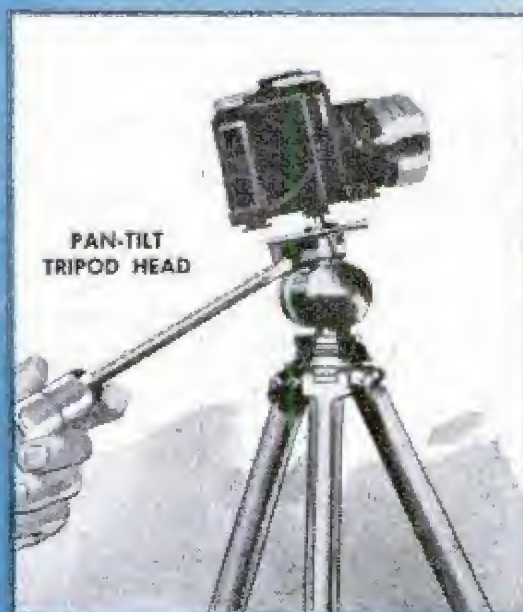
## The CRAFTSMAN

★ Spring is the best time to re-do your hardwood floors. Temperature is right for proper drying of finishing materials and you can have windows open while you work. Helpful instructions for finishing old and new floors are given on page 212.

★ A concrete-feed-seed mixer, made from an oil drum and discarded auto parts as in details, page 226, actually handles these materials efficiently.

★ Nowadays a tilting tripod head is a must item in every photo fan's kit. The one described on page 202 has a new feature you'll like.

★ Among important things to be considered before making a landscape planting are age of the shrubs at planting time, and size and height at full growth. Read the story on page 192 for helpful pointers.



PAN-TILT  
TRIPOD HEAD



LANDSCAPING



# NOVELTY HARDWARE

*You Can Make*

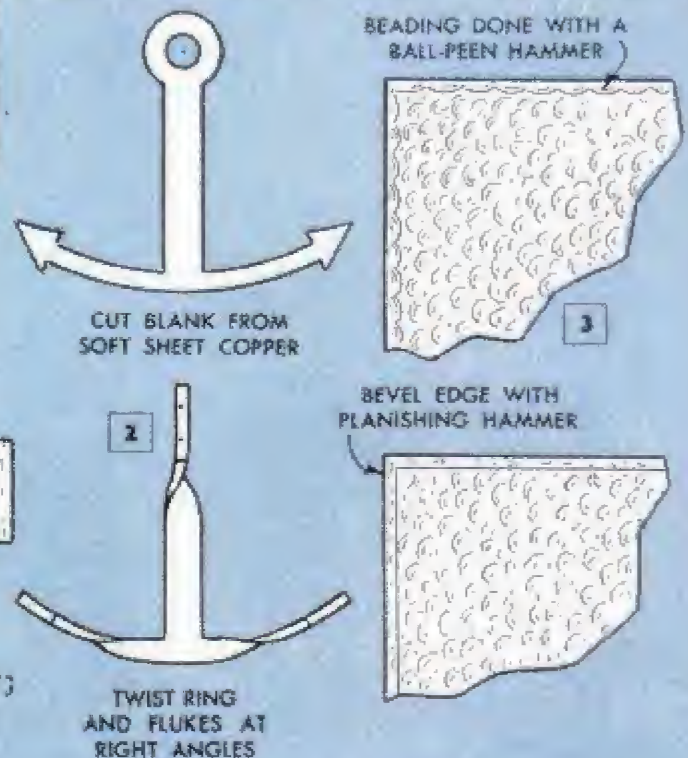
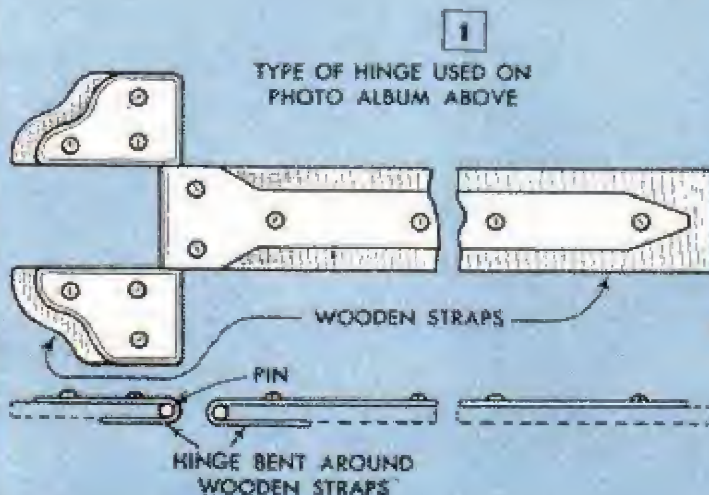
By Dick Hutchinson

**S**PECIAL hand-wrought hardware of polished copper or brass will add an attractive and personal touch to your craftwork. Such hardware, a few pieces of which are pictured and listed at the left, is difficult or impossible to purchase, but it can be made for practically nothing from scraps of soft sheet metal. Also, in making it yourself, the hardware can be designed expressly to suit the particular project.

The two examples given on these pages, the photo album and the glove box, show what can be done in combining metal and wood. The photo album incorporates hinges designed to simulate heavy strap hinges which are applied to a cover that is scored vertically to represent the individual boards of a door. The glove box, made in the form of a book, is bound with strap hinges and has a hasp to match the metal fittings sometimes used on a heavily bound volume. Soft sheet copper or brass, 22 or 24-ga., are the best materials to use as they can be cut easily



- |                       |                    |
|-----------------------|--------------------|
| A—Hasp                | F—Hook             |
| B—Double-action catch | G—Pierced hinge    |
| C—Half-strap hinge    | H—Chain and anchor |
| D—Chest handle        | I—Drawer pull      |
| E—Swivel              | J—Corner brace     |

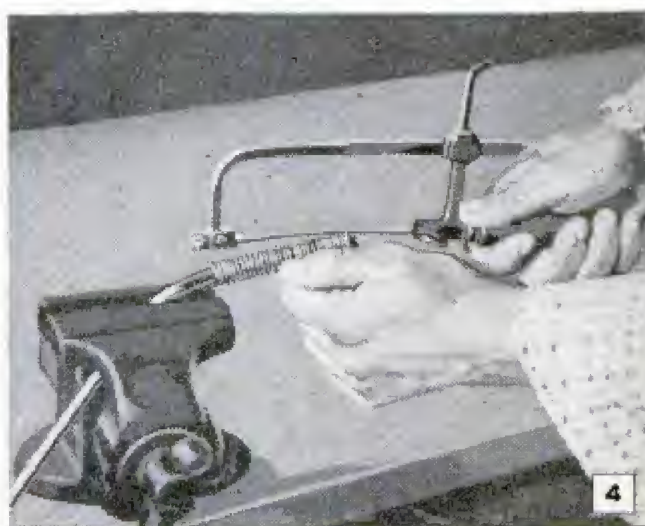




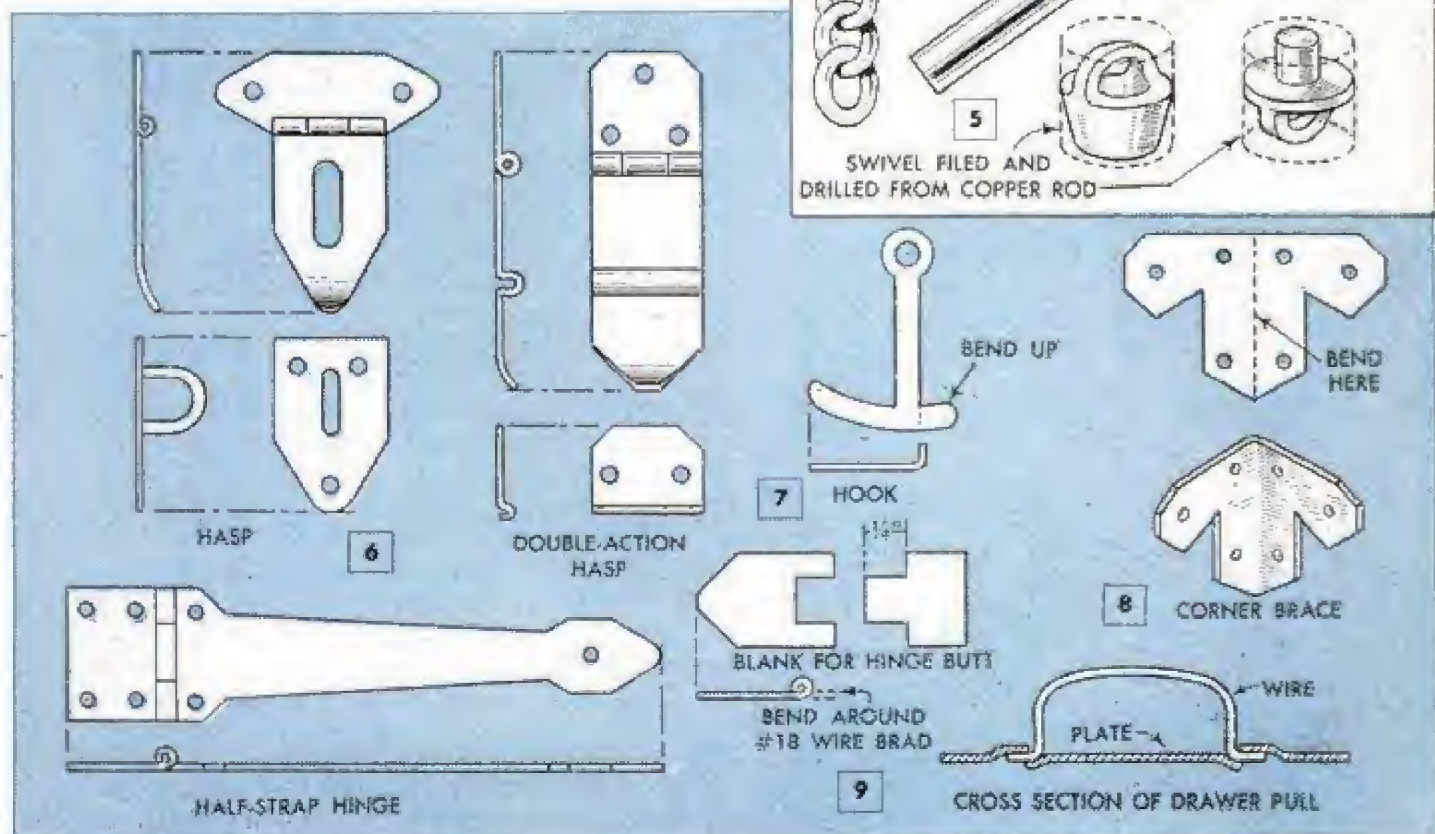
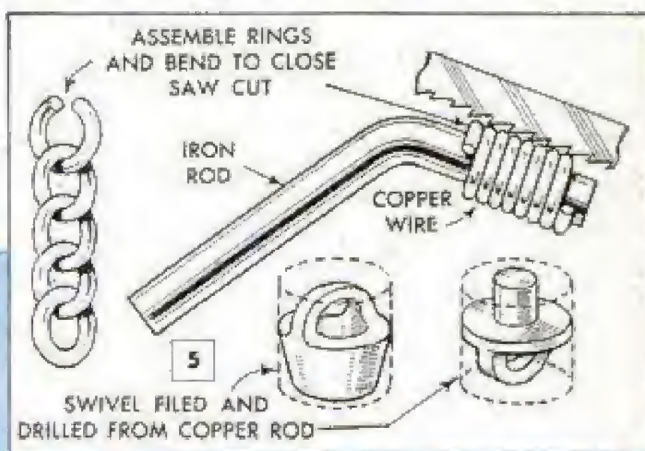
even with a pair of old scissors. Figs. 1 to 9, inclusive, give suggestions for making several simple pieces of special hardware. Fig. 1 details the strap hinge for the photo album. Note how the barrel of the hinge is formed by bending the ends of the metal around a nail and inserting the ends under the wooden straps. The anchor, Fig. 2, can be used purely as a decorative overlay, or it may be twisted as suggested, then attached to the end of a chain and used on a nautical project. The barrel joints of hinges and hasps, Fig. 6, are formed by cutting tabs on the ends of the parts and crimping them around a nail with pliers. The flat hook shown in Fig. 7 has a finger grip to facilitate engaging it in a flat staple.

Outside corner braces of polished or hammered copper add both strength and ornamentation to fancy wooden boxes, Fig. 3. An attractive finish for these as well as the other metal fittings is produced by hammering the surface lightly with the round nose of a ball-peen hammer. Edges of the metal are beveled by tapping lightly with a planishing hammer, after which the surface is polished with steel wool and coated with clear lacquer.

Figs. 4 and 5 show an easy way of forming the links for a decorative chain. Copper wire is wound around an iron rod of the proper size and then formed into links by sawing lengthwise through the wire winding. The links are assembled into a chain by interlacing them and squeezing the ends together. Such chain is suitable for ship-model fittings or other purposes where it is not subject to strain.



After winding copper wire around rod of proper size, the wire winding is cut lengthwise to form links





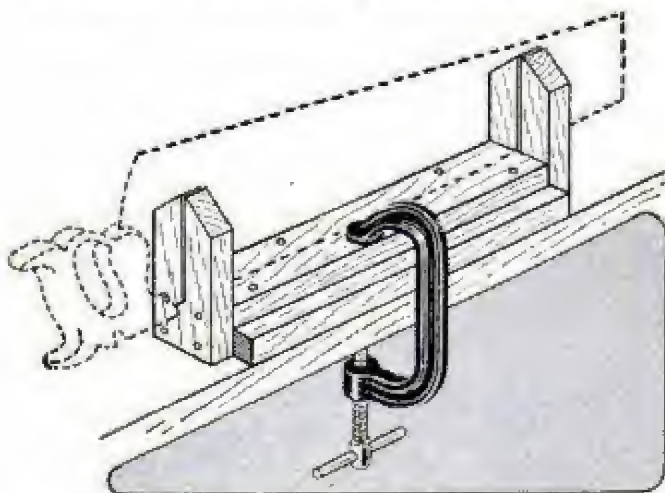
## Furniture Scratches Touched Up With Brown Pencil



To cover scratches in furniture or interior trim that you do not wish to refinish, use a pencil with a brown crayon lead. This makes an inconspicuous repair and, if the pencil mark is covered with furniture wax or polish, the scratch will be difficult to detect. After filling the scratch, rub it with the tip of your finger to blend the color. Keep a fine point on the pencil lead for filling very small scratches.

## Saw Vise for Home Workshop

For the craftsman who has an occasional saw-filing job, this vise, or holder, is simple to make and economical in cost. The only materials required are a few odds and ends of scrap wood. Dimensions are omitted because they are determined by the size of handsaws that are to be sharpened. Construction details and method of assembly are indicated in the drawing. A C-clamp is used to fasten the holder to a workbench and then wedges are inserted



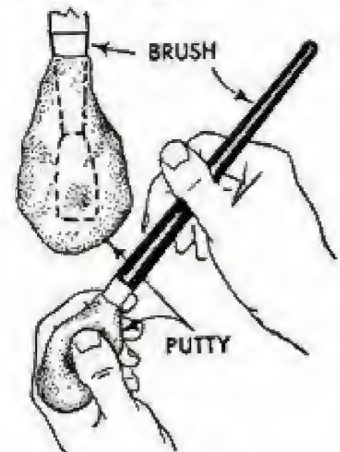
in the slotted endpieces to clamp the blade firmly. Be sure to use hardwood for the endpieces to prevent splitting when wedging. When sharpening a saw, support it with the hand placed close to the point where you are filing to prevent the blade from whipping.

Victor Lamoy, Upper Jay, N. Y.

## Paintbrush Kept in Readiness By Sealing in Ball of Putty

When a small paintbrush is laid aside to be used subsequently to apply the same color of paint, one painter does away with the necessity of having to clean the brush each time. He merely wipes off the excess paint and rolls the bristle end of the brush in a ball of soft putty. The putty keeps the bristles moist and ready for use by forming an airtight seal around them.

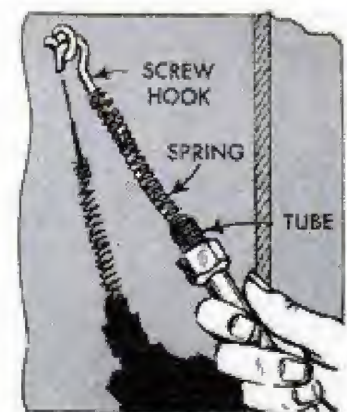
G. E. Hendrickson, Argyle, Wis.



## Screw Hook Aids in Cleaning Gasoline-Stove Generator

The generators or generating tubes on some gasoline cooking ranges are "packed" with a small coil spring, which aids in vaporizing the gasoline fuel before it enters the stove burner. After varying periods of use, depending on the quality of fuel, the spring becomes clogged with carbon and must be cleaned or replaced. However, removing the spring is difficult without the proper tools. While trying to repair his own generator, one man found that he could pull out the spring by using a screw hook as indicated. The hook must be of a diameter just slightly larger than the inside diameter of the spring so that when it is screwed in, the threads will engage the coils of the spring.

Lester M. Diehl, Pittsfield, Mass.

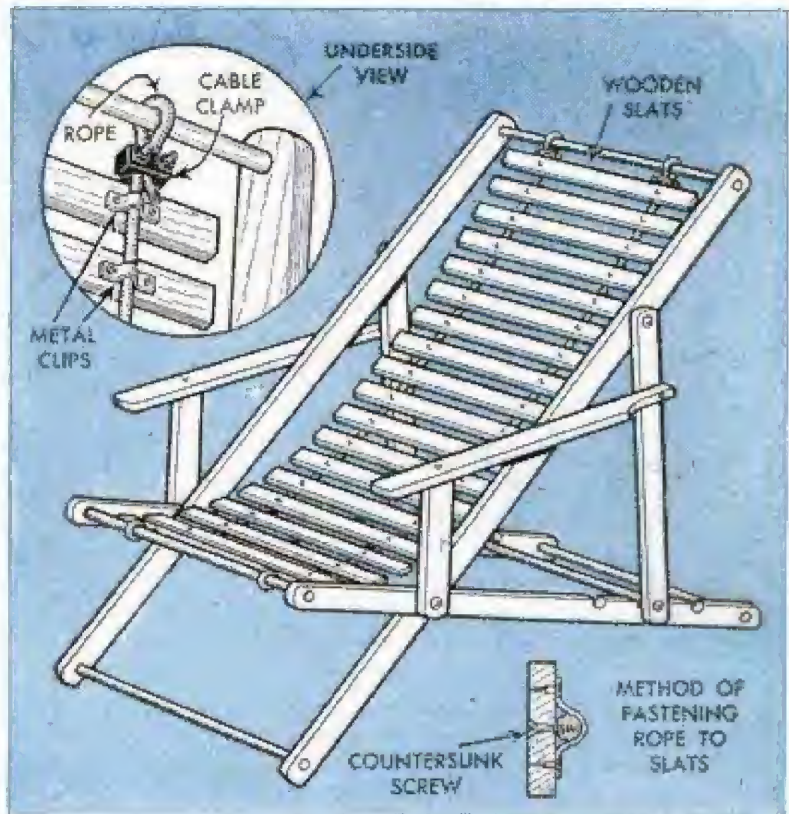


¶ If a stairway to a basement or attic is without handrails, stretch a strong rope at the sides to serve as temporary rails.



# Wooden Slats Replace Canvas Seat of Lawn Chair

If the canvas seats on your lawn chairs are threadbare or torn, replace them with a durable slat seat like this one. In addition to having an attractive appearance, it will withstand plenty of punishment from the elements, and unlike a canvas seat, you can use it immediately after a rain by wiping it dry. To make this slat-type seat, get two lengths of fairly heavy rope long enough to permit sufficient curvature for comfort, and then cut a number of wooden slats to the same length as the width of the canvas. Fasten the slats to the rope about 1 in. apart with a small metal clip near each end. A screw, set flush in the face side of the slat opposite the clip and turned into the rope, keeps the slat from slipping. Of course, you can paint the slats either before or after mounting them on the ropes. However, painting them before assembling likely will result in a better looking job. Regardless of the paint requirements for the rest of the chair, give the slats at least two coats of a good outdoor paint. After the paint dries, attach the seat to the chair by looping the ends of the rope over the



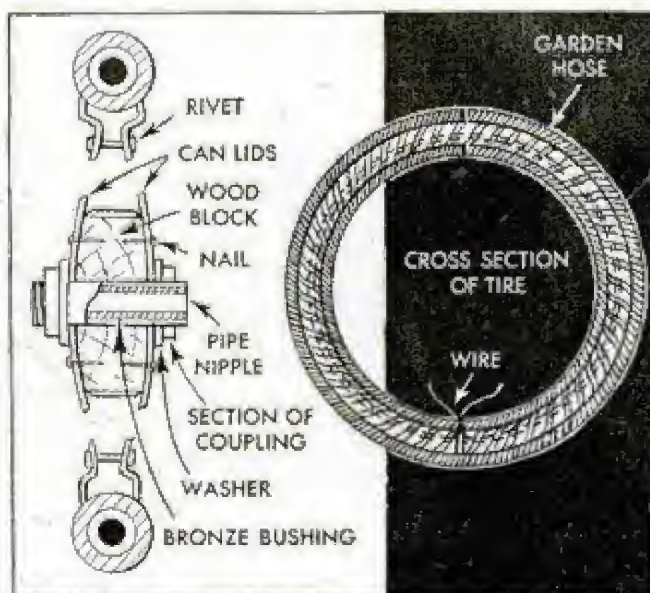
crosspieces of the frame and fastening them with cable clamps. Another method of doing this, which permits easy removal, is to tie the ends of the ropes to S-hooks and hook them over the crosspieces.

Walter Stolt, Cleveland, Ohio.

## Rubber-Tired Wheels for Toys Formed From Can Lids and Hose

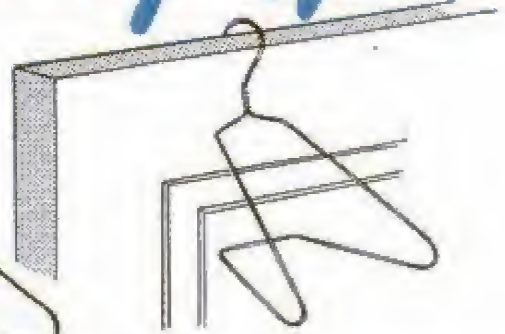
Sturdy wheels for small coaster wagons, doll buggies, scooters, etc., can be made by using compression-type can lids for wheel disks and garden hose for tires. First, shape a hardwood hub for each wheel as shown in the left-hand detail, and then dish the can lids to match the curvature of the hub. Drill a hole through the wooden

hub for the bearing assembly, which consists of a bronze bushing pressed into a pipe nipple. The latter is held in place by washers and short lengths of pipe coupling that serve as nuts for the threaded ends of the nipple. The can lids, when placed back to back, form a tire rim. The tire is made from a length of garden hose reinforced with a core of armored electrical cable. Cut the cable a little shorter than the length of hose required and pull out the wires. Next, drill a 1/4-in. hole through one wall of the hose at a point one half its length. Insert a long tie wire through the cable, letting it extend about 2 ft. from each end, and pass one end of the wire through the hole in the hose. After this, push the end of the cable into the same end of the hose until it meets the hole in the hose. Do the same with the other end of the wire and cable, inserting both in the opposite end of the hose. Finally, when the ends of the hose meet, pull the tie wires taut and twist them. Mount the tire between the can lids before they are nailed to the hub and riveted as shown.—Ernest F. Lind, Buchans, Newfoundland.





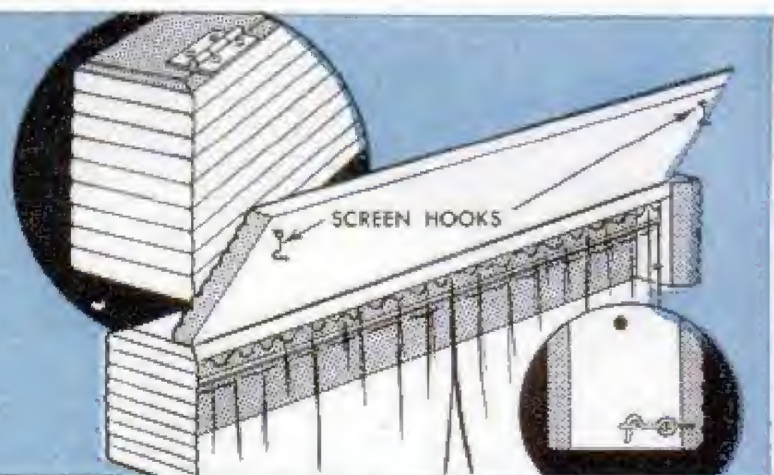
# Solving Home



A light wire coat hanger, bent as shown and hooked over the top of a door, provides a handy rack for drying hose, gloves and other small items occasionally washed and dried over night. Use a hanger that is painted to prevent rust stains

As a precaution against accidentally taking poison liquids internally by picking up the wrong bottle, seal the cap with adhesive tape. The tape will forestall hurried doses before realizing your mistake

Removing drapes from shallow cornices is made more convenient if the facing board of the cornice is hinged. This is especially helpful when there isn't room to reach underneath to lift out the drapery rod



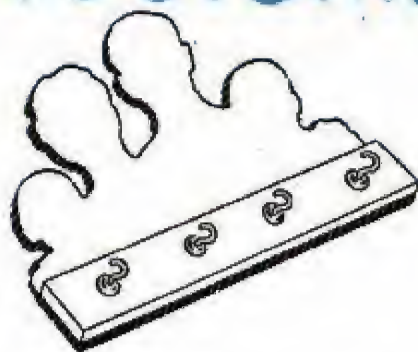
Two paper plates, one of them cut in half and laced to the other with colored cord, form an attractive holder for bills and recipes. A decal or picture clipped from a magazine will add a decorative touch

If the snap fasteners on the inside of ladies' gashers are rough, causing snags and runs in sheer hose, coat the rough parts and surrounding lining with several applications of clear fingernail polish





# Problems

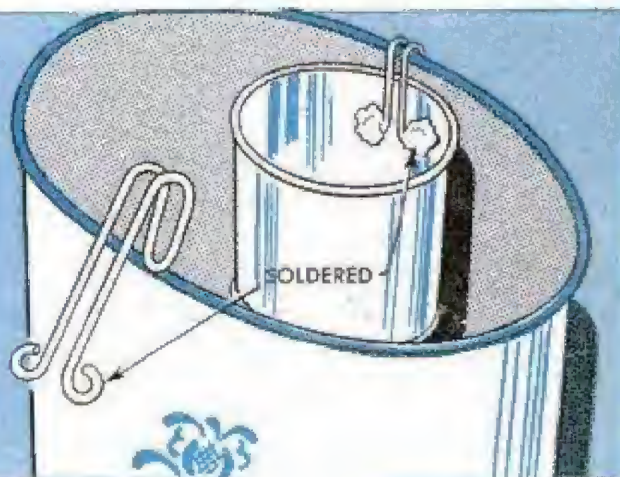


This toothbrush holder, attached to a cutout family photo, features a novel way of identifying the brush of each member. Glue the photo to a piece of  $\frac{1}{4}$ -in. plywood and outline with a jigsaw. Then glue a wooden crossbar to the bottom of the cutout as shown and screw a hook under each figure in photo. Apply a coat of clear shellac to finish the holder.



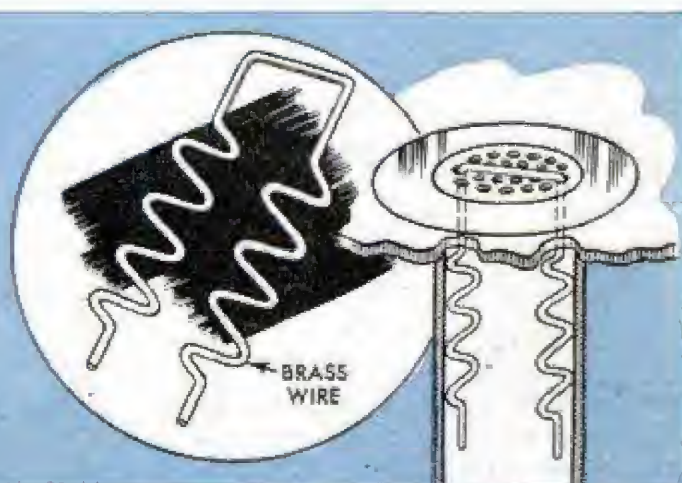
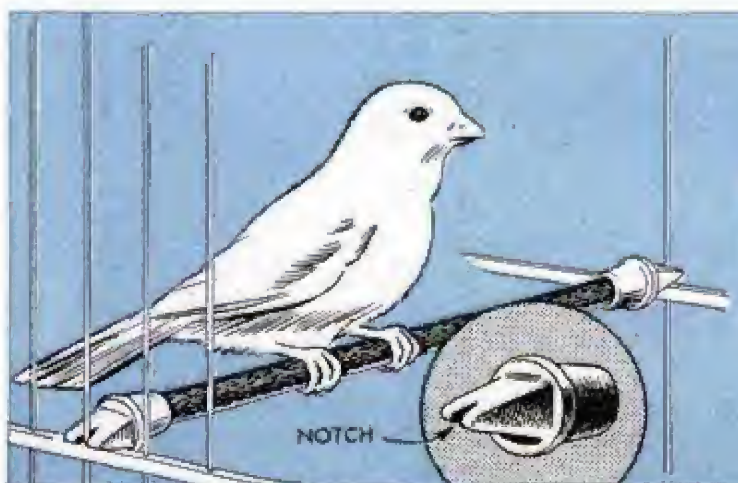
Clean milk cartons cut in half serve as excellent containers for holding small amounts of paint or varnish. The straight side of the carton affords a better wiping edge for the brush than the rim of a can.

Fires caused by dumping the contents of ash trays into a wastebasket are avoided by hanging a small tin can inside the basket to hold the ashes. The can is supported by a wire hook soldered to the side.



Split ends of a bird-cage perch can be repaired by slipping pencil-tip erasers over them. Notch the heads of the erasers to hold the perch securely in place and to permit easy removal from the bird cage.

The noise of a whirlpool in the sink drain is eliminated by inserting a length of brass wire through holes in the strainer, bending the ends as shown. In some cases, two lengths of wire may be required.





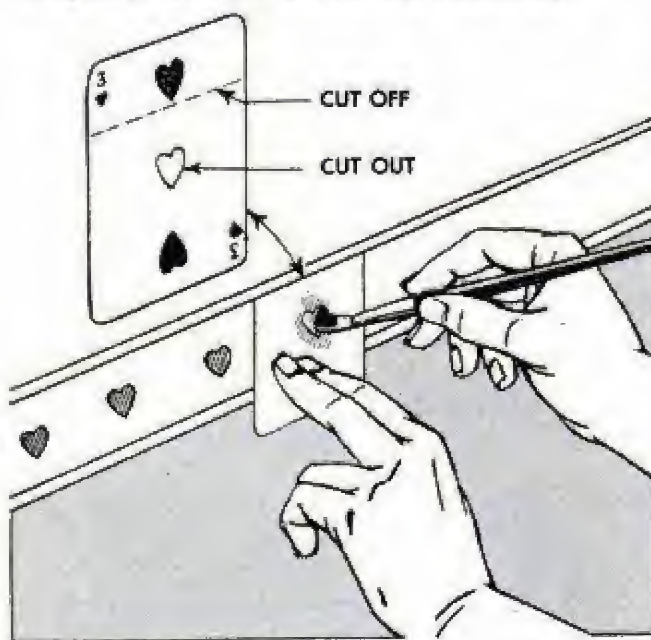
## Improving Wire Coat Hanger By Adding Spring Clothespins



Creases and wrinkles in skirts and slacks, usually resulting from hanging such items over a wire coat hanger, can be avoided by slipping a couple of spring clothespins over the hanger and using them to hang the garments by the top or cuff. To attach the clothespins to the hanger, untwist the wire hanger where it is formed into a hook, insert it through the spring of the clothespin and retwist.

David B. Clapp, Livingston, N. J.

## Playing Cards Used as Stencils

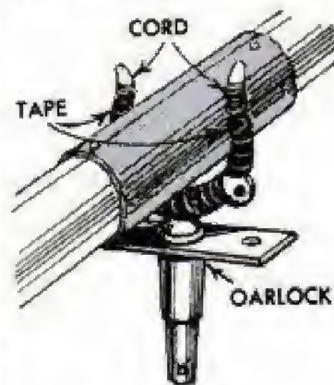


Painting an attractive border around the chair rail in a kitchen or bathroom is easy if you use stencils made from playing cards. Cut out the center heart, spade, diamond or club with a sharp knife or razor blade and then trim the top edge

so it can be lined up with the top of the rail to serve as a height gauge. Variety in design is secured by alternating the cards and choosing contrasting colors. To avoid smearing the paint, use old linen-finished cards and replace them whenever necessary.—Don Brooks, Chicago.

## Friction Tape on Oarlocks Prevents Slipping of Oars

To help keep the oars from tipping or sliding out of position when using a socket-type oarlock, a spiral wrapping of ordinary friction tape will provide a nonslip surface. Wrap the oarlocks with three layers of tape and bind the ends of the tape with cord, as shown, to prevent unwrapping.—Albert M. Lindner, Jr., Cold Spring, N. Y.



## Reverse Kitchen-Cabinet Worktable To Place Worn Edge at Rear

One of the first places to show wear on the worktable of a kitchen cabinet is usually along the front edge. When this happens, examine the underframing of the table top to determine whether it can be reversed. This part on some cabinets is simply held with wood screws which can be removed easily, and the top placed end for end to bring the marred edge at the rear where it is less noticeable. This will keep the cabinet looking its best.

L. C. Barkley, Glendale, Calif.

## Artificial Flowers Cleaned With Corn Meal

Dusting a bouquet of artificial flowers is easy if you use a paper bag large enough to hold the bouquet, and fill it to a depth of about 1 inch with corn meal. Insert the flowers as shown, grasp the bag and stems and shake gently. Then remove the flowers from the bag and shake off the clinging particles of the cleaner.



Opie Read, Jr., Chicago.



# CARS NEED CARE

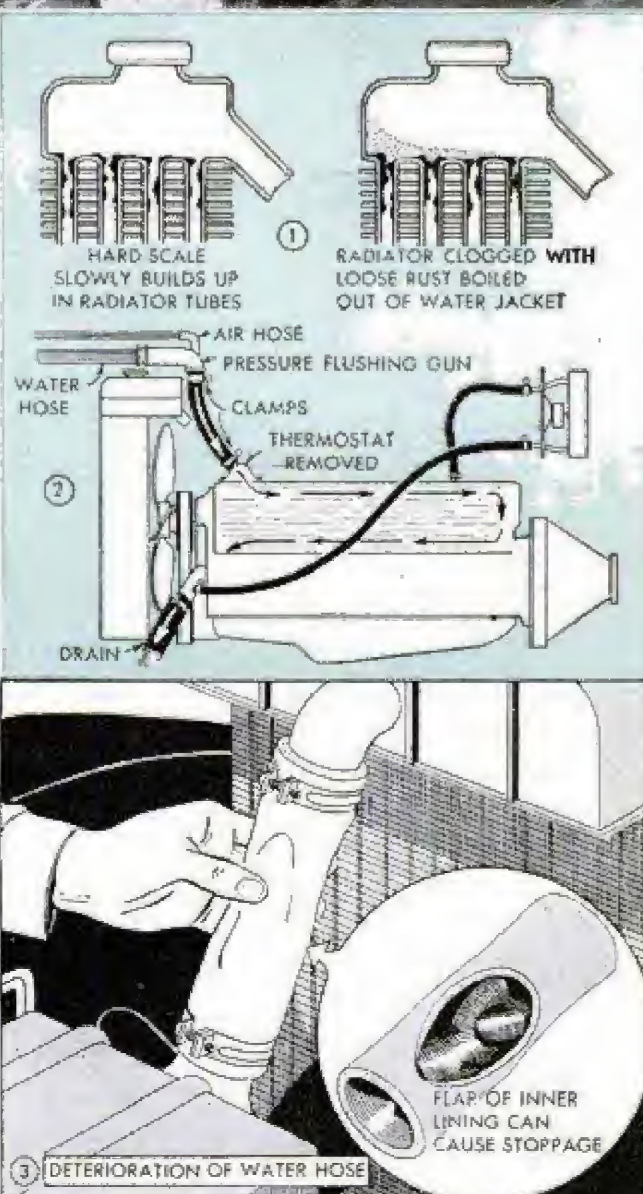


Costly repairs due to engine overheating can be avoided by thoroughly cleaning and flushing cooling system periodically

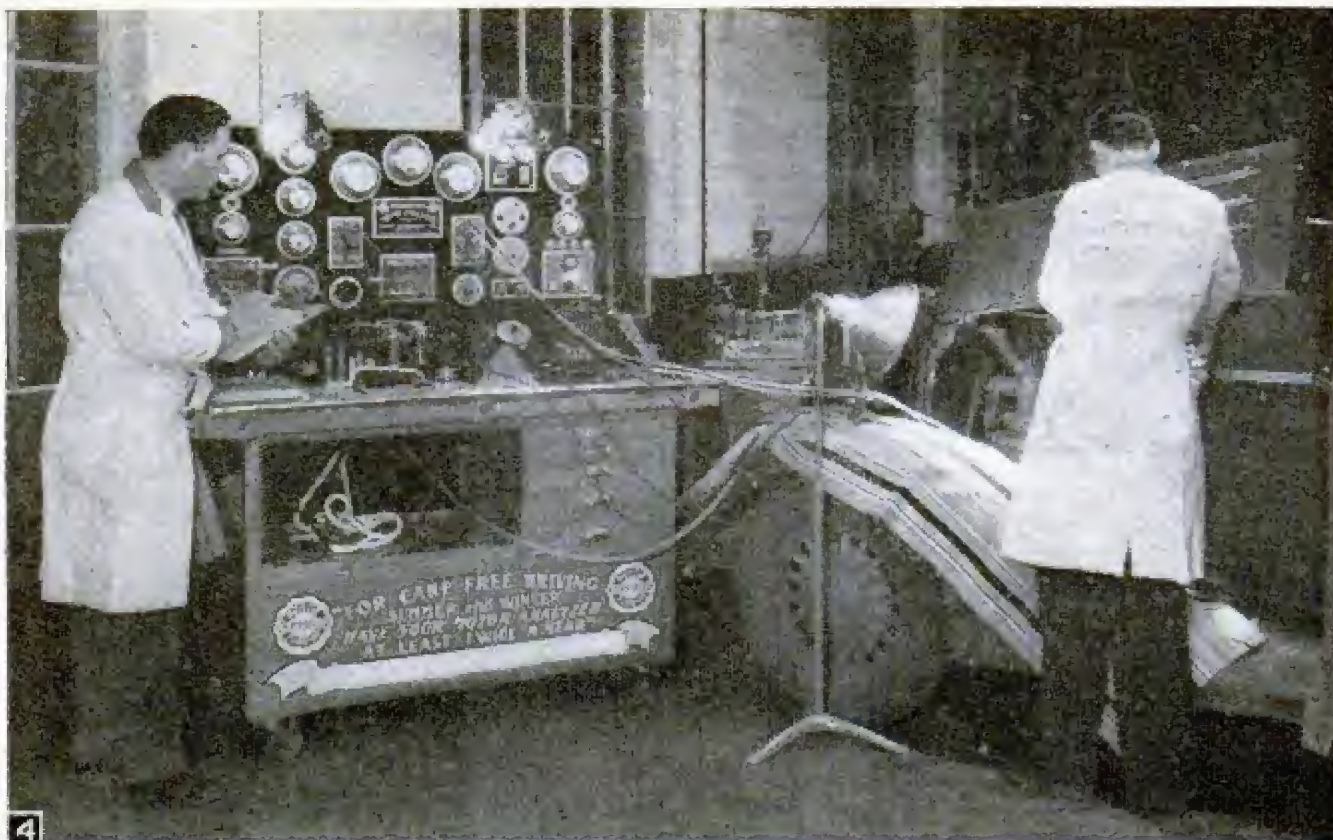
**By Phil Ruskin**

**K**EEPING your car on the road does not call for a continuous process of tinkering with the mechanical parts. Instead it's regular periodic attention to simple details that keeps a car going year after year. Many vital mechanical parts never really wear out. They deteriorate simply because of neglect and inattention to a regular servicing schedule. The cooling system is a good example. With proper care, it will last as long as the car, but if it is not serviced regularly, it can be a constant source of trouble. Figs. 1 and 3 show why it is necessary to do a thorough job of flushing out the system periodically and why the hose should be carefully checked on schedule. Even though you use soft water or a rust inhibitor each time the cooling solution is changed, considerable debris collects in the cooling spaces of the engine block. This should be cleaned out at least twice a year with a flushing gun as in Fig. 2. Reverse flush the radiator at the same time to remove loose rust and other particles that may collect in the top tank, Fig. 1. Hard scale on the tubes and in the engine block can be removed only with special cleaners which dissolve these deposits. Follow the manufacturer's directions when using any of these preparations.

Another important check easily made periodically by the car owner, is that pictured in Fig. 5. The instruction book that







**4** An accurate check with scientific motor-testing equipment takes the guesswork out of tuning up an engine

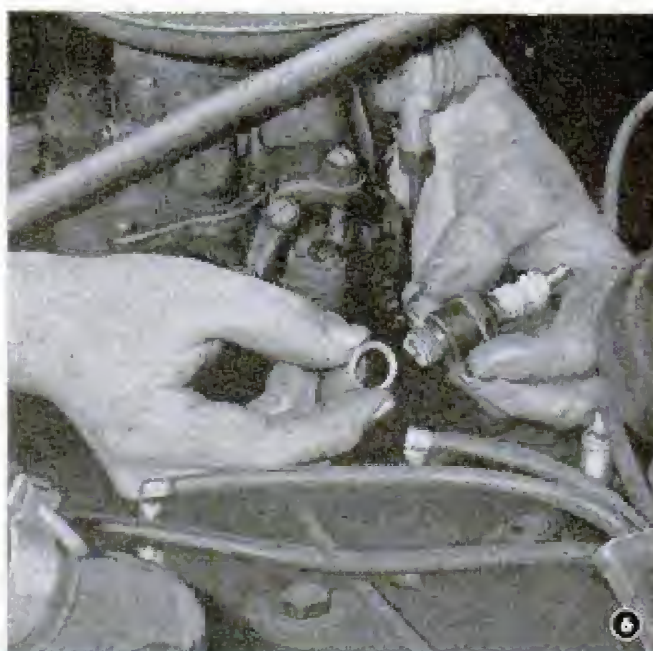
comes with the car usually specifies a fan-belt deflection, or slack, ranging from  $\frac{1}{2}$  to  $\frac{3}{4}$  in. Measure this with a ruler and straightedge as shown and adjust to the specified tension. When you put on a new fan belt it is particularly important to check this adjustment often, as a new belt will slacken with use.

Periodic instrument checks at your local garage, Fig. 4, will disclose any faults developing in the fuel and ignition systems, which then can be remedied easily

before they create serious trouble. When the engine gets sluggish, lacks pick-up or runs roughly, its poor performance usually indicates that either the fuel or ignition system, or possibly both, are at fault. Other probable causes should not be overlooked, however. Faulty valves or a clogged cooling system can cause somewhat similar symptoms. If sluggish engine performance indicates poor compression, first thought usually is given the piston rings and the condition of the pistons and



**5** A fan belt that's too tight will squeal and wear rapidly. Adjust to produce about  $\frac{1}{2}$  to  $\frac{3}{4}$ -in. slack



**6** Engine compression can be improved by replacing worn gaskets when plugs are removed for cleaning



cylinders. However, there is another possible cause, not at all common, but it should be kept in mind and always checked before dismantling the engine. In older cars, where spark plugs have been removed several times for cleaning and checking the spacing of the points, the copper plug gaskets, Fig. 6, are frequently flattened or roughened so that they no longer provide a tight seal. This can cause a slight compression leak which is difficult to detect. Several leaky plug gaskets, even if each leak is only very slight, can materially affect engine performance. A good insurance against trouble from this source is taking care to tighten the plugs uniformly after removal, but avoid drawing them too tight. Before screwing the plug in, see that there is no grit or other hard substance on the gasket. The spark gap should be adjusted to the setting specified by the manufacturer. The slow burning away of the bendable point reduces its diameter and changes the gap correspondingly. Because of this, the spark gap in each plug should be checked regularly. Use a feeler gauge or a spark-plug tool made especially for the purpose. Keep close check on the ignition wires in an older car, Fig. 8. The insulation usually breaks first at the



Keep the water level in your battery about  $\frac{3}{8}$  in. above the top of the plates and use only pure distilled water. Do not overfill

bends and where the wires pass close to the engine block. When small cracks show at these points the wires should be replaced. If this is not done, current may leak to the block and "short" a plug.

With regular care a battery will last for at least two years, more often longer. Watch for corrosion around the terminals, on the clamp end of the ground strap and

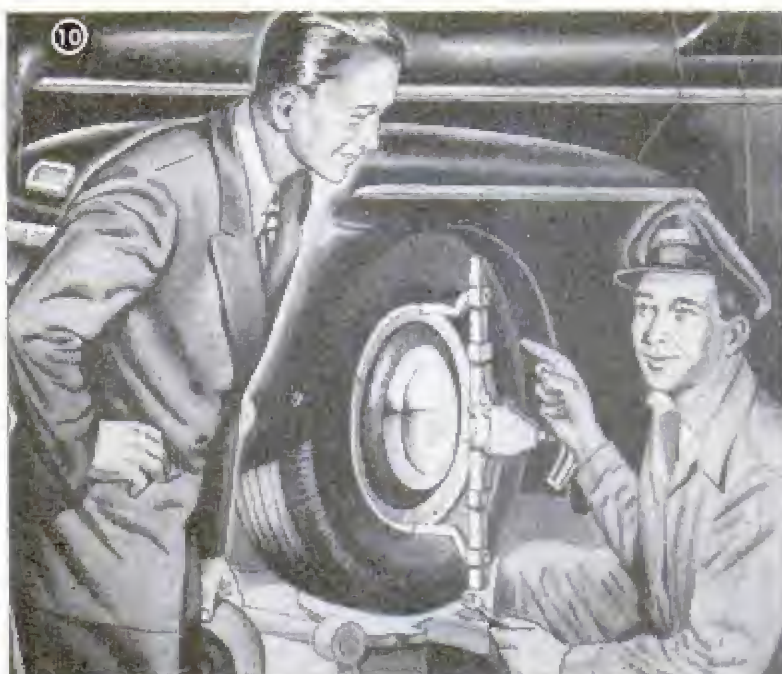


Ignition wires should be examined periodically to see that there are no bare or frayed spots

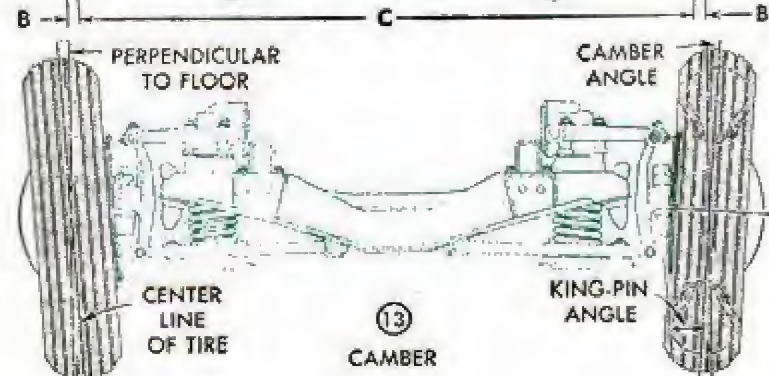
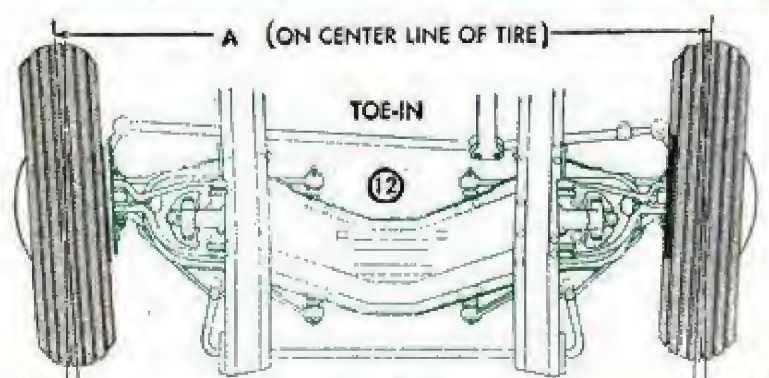
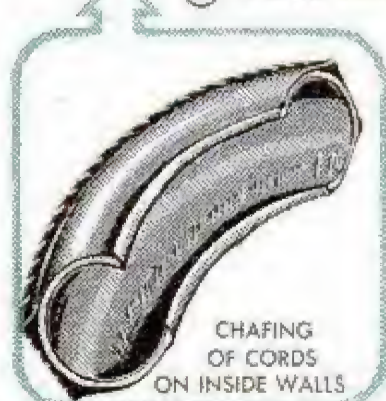


Keep all the instrument-panel gauges and switches in good working condition for safety and economy



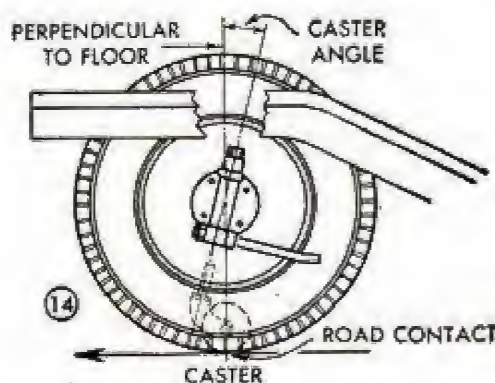


11 CORRECT INFLATION IS IMPORTANT



on the cradle. Wash this off with a moderately strong soda water, rinse with clear water and wipe dry. Then coat all the affected parts with petroleum jelly. Be sure that the battery is supported firmly in the cradle so that it cannot shift. Looseness of the lead clamps on the terminals or a faulty connection of the ground strap to the engine block or car frame may cause hard starting and perhaps engine failure on the road. Keep the battery solution at the correct level by adding distilled water at regular intervals, Fig. 7. Don't add water during cold weather without driving the car immediately. If the car stands idle the fresh water may freeze and crack the battery case. On older cars not fitted with voltage regulators the charging rate should be watched carefully. Adjust the rate so that the battery is kept fully charged at all times. Check occasionally with a hydrometer. Keep all gauges and switches on the instrument panel, Fig. 9, in good working order, particularly the ammeter and oil-pressure gauge.

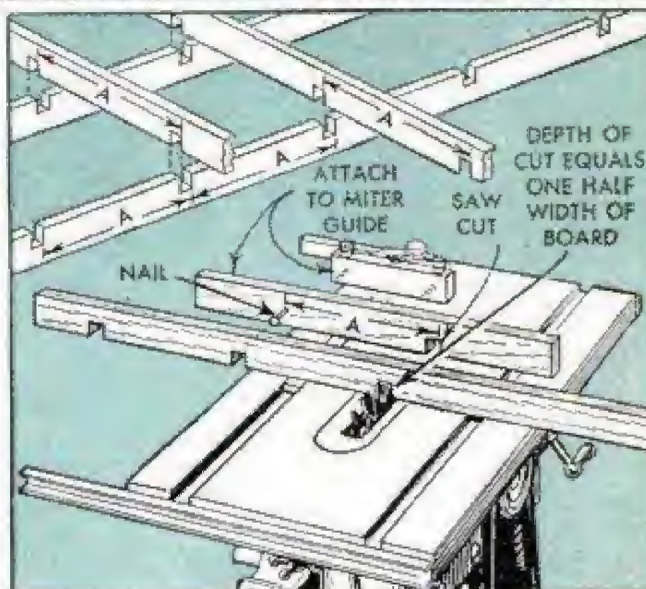
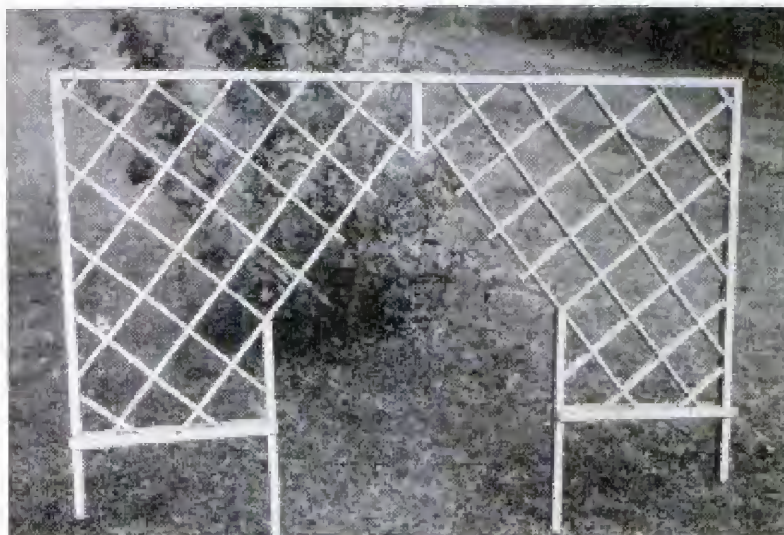
If you hit a bad bump or nudge a high curb too hard with one wheel while parking, it's a good idea to have the wheel alignment checked immediately. The alignment check should always include toe-in, camber and caster of the front wheels, Figs. 10, 12, 13 and 14. Toe-in slightly out, too little camber or incorrect caster angle can cause undue wear on the tires and hard steering. When adjusting any of these wheel angles, follow the recommendations of the car manufacturer. Under or over inflation can cut up tires quickly even when driving is done at moderate speeds on good roads. Fig. 11 shows why, and how.





# Half-Lapped Trellis Cut Quickly on Table Saw

An attractive trellis of the type shown in the photo is easy to build with half-lapped joints if this miter-guide jig is used to space the notches uniformly. The notches preferably are made with a dado saw, but they also can be cut with an ordinary saw blade. The notches, of course, must be the same width as the thickness of the stock and as deep as one half its width. Standard lattice stock is used for the grillwork of the trellis which, when assembled, is framed with 1 by 2-inch pieces. First, notch a short length of stock and drive a nail into it as indicated, distance A being equal to the distance the notches are to be spaced. Then screw this strip to the miter guide on the saw table. To cut the notches with a dado saw, make the first one near the end of the strip, and using the jig with the nail as a stop pin, proceed to cut each succeeding notch. Approximately the same method is used with a saw blade, except that the notches are made by holding one side of the preceding notch against the nail and making repeated cuts until the other side of the notch contacts the nail. By adjusting the miter guide, angle cuts also can be made in this way to obtain a diamond-shaped pattern. After notching the strips, cut them to length and assemble the trellis with brads in the usual manner by driving them through the center of the half-lapped joints. Before nailing each joint, apply white lead to the meeting faces



to prevent dry rot. The trellis is supported by two center stakes, the ends of which are preserved by dipping in creosote.

*W.T.M. Concrete*

## Flagstone Retaining Wall Around Tree Provides Attractive Fernery

This unusual and beautiful outdoor fernery is made from flagstones which encircle the trunk of a tree to form a retain-



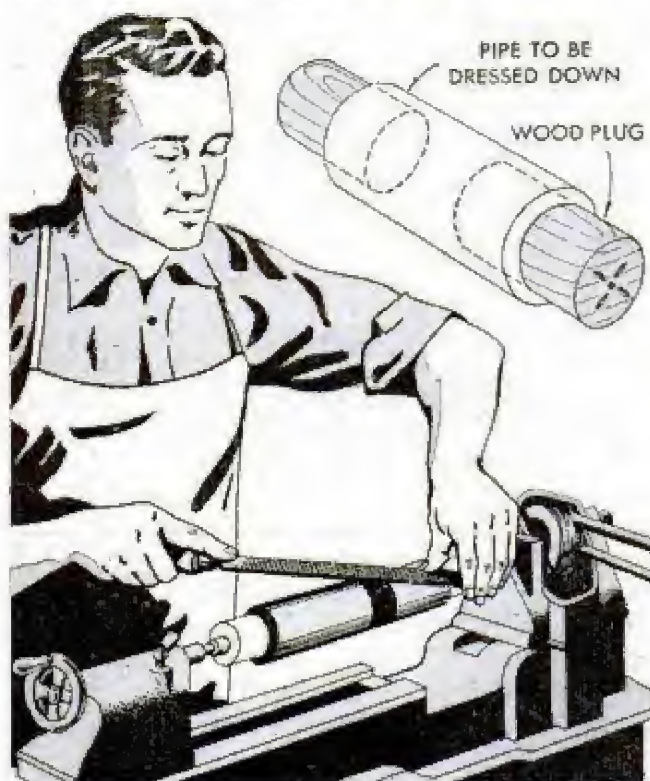
ing wall for ferns or other rock-garden plants. Build a low wall similar to the one shown in the photo, allowing the coping course on top of the wall to project a few inches. If you wish, mix a little lampblack with the mortar so that the black mortar joints will contrast with the light-colored stone. Then fill the area inside the wall with a suitable soil and plant ferns well in the background near the tree. To add variety, place small, brightly colored foliage plants around the ferns along the inner edge of the coping.—Bob Hurst, Chicago.

## Repaint Window Sills Frequently

Outside window sills absorb more punishment from the weather than any other part of the house. To preserve them, paint them at least every other year even though the rest of the house is not to be painted.



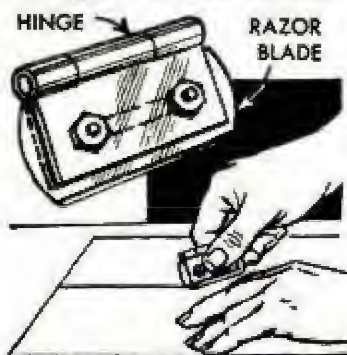
## Pipe Mounted in Wood Lathe With Aid of Plug "Centers"



Not having a metal-turning lathe to turn down a length of pipe for a sliding fit through a pipe tee, one man did the job on his wood lathe with a file. First, turn a 6-in. length of hardwood to a diameter slightly greater than the inside diameter of the pipe. Check to see that it is a tight fit in the pipe, and cut it in half to form two 3-in. plugs. Tap a plug securely into each end of the pipe, leaving about  $\frac{1}{2}$  in. of the plug projecting. Center the unit in the lathe and see that the spur and tailstock center enter the indentations made when the plugs were turned. With the lathe running at a speed of approximately 1200 r.p.m., rough-file the pipe to size with a double-cut flat file and then finish the surface with emery cloth. When the job is completed, the tight-fitting plugs are removed from the pipe by clamping them between the jaws of a machinist's vise and turning the pipe.

C. R. Schlegel, Jenkintown, Pa.

## Hinge Forms Razor-Blade Holder

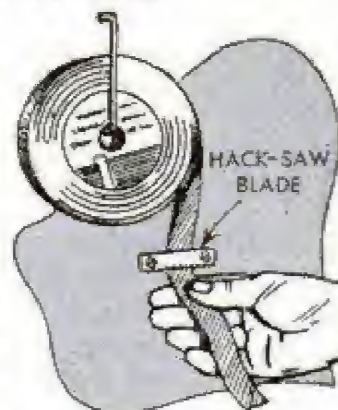


When using a double-edged razor blade to rip seams, scrape paint or cut paper, a holder to protect the fingers can be improvised by clamping the blade between the leaves of a

small butt hinge. Select a hinge that will cover the top edge of the blade completely, and fasten the latter with two small stove bolts inserted through the slot in the blade.—Ronald Eyrich, Milwaukee, Wis.

## Abrasive-Cloth Dispenser

Strips of roll-type abrasive tape are easy to tear off if the roll is mounted in this simple dispenser. Bend a piece of heavy wire to the shape of a wide staple and sharpen both ends so they can be driven into a wall to hold the roll as



shown. Make the staple large enough to allow a full roll to rotate freely. A short piece of hacksaw blade is screwed to the wall to serve as a tearing edge. Thread the cloth under the blade with the grit side toward the wall so that grit will not clog the teeth of the blade when tearing.

Benj. Nielsen, Aurora, Nebr.

## Unusual Hanging Flower Box Made From Auto Tire

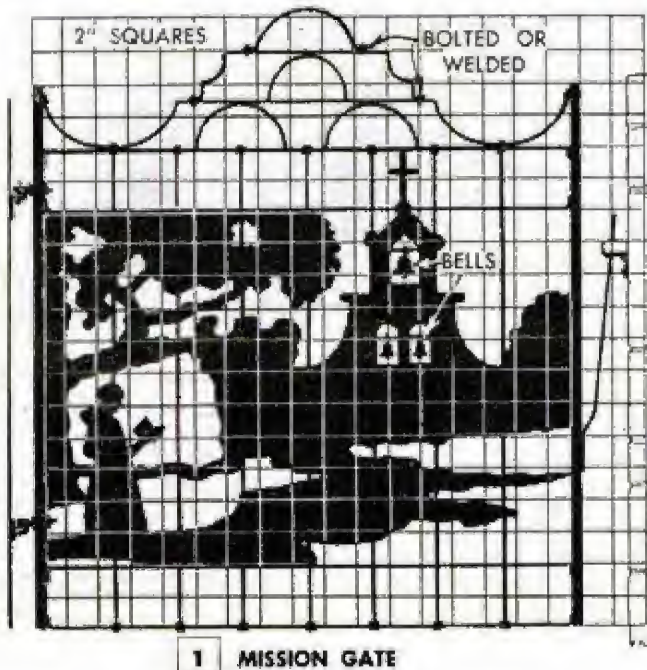
With a section of auto-tire casing, two metal rings and some wire, it is easy to make this novel flower box. When the box is fastened to a porch column, vines and flowers trailing over a grille produce an unusual floral effect. Fasten the two supporting rings to the tire with wires through holes punched in the bead. Wire the rings together at the top and solder a grillwork between them, forming it in an attractive design. Finish with enamel.

Wm. M. Maddox, Jackson, Ga.





# Two Distinctive Gates for the Informal Garden



1 MISSION GATE

Here are two unusual and interesting gates for a garden entrance or pathway to the house. The mission gate, Fig. 1, with its tinkling bells, and the ranch-type gate paneled with horseshoes, will impart a western atmosphere to your grounds. The mission gate is constructed of two  $\frac{3}{4}$ -in. iron bars used as end posts, to which are bolted four crosspieces made from  $\frac{3}{16}$ -in. flat iron. The seven vertical members are  $\frac{3}{8}$ -in. iron rods, threaded at both ends and fastened to the top and bottom pieces with two nuts. Form the ornamental ironwork at the top of the gate from the same material as the four crosspieces and bolt it to the end posts. The gate is pivoted on eyebolts and is fitted with a spring-type latch. Make a full-sized paper pattern for the silhouette and tape it to a piece of 26 or 28-ga. sheet metal. Then cut out the metal silhouette by using a small cold chisel and anvil. Mount the bells in position rigidly so they will ring only when the gate is moved, and solder the silhouette to the gate. After assembling, paint the gate with



2 RANCH-TYPE GATE

red lead and then finish a dull black to contrast with brass or silver bells.

Construct the ranch-type gate, Fig. 2, from 1-in. pipe, using tees and elbows where indicated. Over-all dimensions are determined by the size of horseshoes used, which are either welded together or merely wired to poultry fencing stretched over the opening. Add a personal touch to the gate by forming "rope" initials from a single length of soft-iron wire and welding or wiring them to the upper opening of the gate. In keeping with the western theme, suspend the gate between two bark-covered posts. A  $\frac{3}{8}$ -in. iron rod inserted through eyebolts in the edge of the frame and in one of the supporting posts, forms the hinge. Add a nut to the top of the rod to prevent it from sliding through the eyes, and cap the open tees with pipe plugs.—R. W. Madden, Palatine, Ill.

## Removing Wallboard From Studding

Wallboard or insulating sheathing may be removed from studding without damage to the board by removing the nailheads with a drill bit



slightly larger than the shank of the nail. After drilling through just the head of the nail as shown, drive the rest of the nail all the way into the stud with a pin punch.



# Beautify with

By  
Paul Hadley



**P**LANNED SHRUBBERY plantings not only add materially to the value of any home, large or small, but they give it that natural appearance so difficult to achieve in any other way. Hardy flowering shrubs, climbing vines, evergreens and small ornamental trees now are available from nursery stocks for almost any exposure and type of architectural design, either old or new. These classify mainly as the deciduous shrubs and ornamental trees, which shed their foliage at the end of the growing season, and the evergreens, which retain their foliage and continue growth at varying rates throughout the whole year. Both of these classifications are subdivided into a great number of varieties. In making a selection for a given location, keep in mind the exposure, type of soil, appearance, and especially the spread and height of the

trees and shrubs when they have attained maximum growth. In some locations and for certain specific purposes, the relative rates of growth of a group of shrubs must be considered in the planning. Most of the extremely hardy shrubs grow very slowly, taking years to attain maximum height or spread. Others grow rapidly, taking only two or three seasons to reach tree size from a single nursery "whip." Certain varieties of slow growers have been designed by nature to withstand very severe cold without harm and without any additional protection. Some thrive in exposed positions in thin soils, while other more tender plants require sheltered locations and moist soils rich in plant foods. This wide variety gives you a choice of plants with size, color of foliage and bloom, and growth habits suitable for almost any plan,

In corner plantings, left, low-growing shrubs with thick foliage ordinarily are planted in the foreground. Right, formal plantings require regular seasonal care. Trimming must be done repeatedly as growth progresses





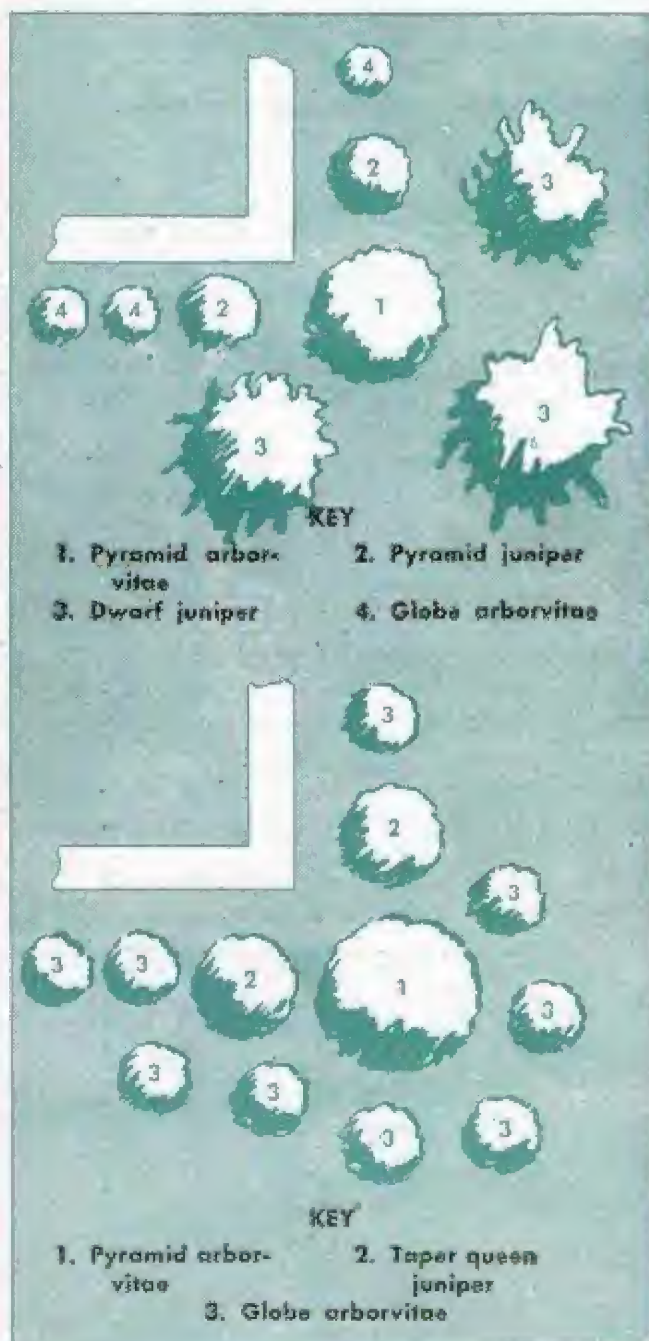
# SHRUBS

location and climatic conditions.

Corner plantings, using both tall, conical shrubs and the low-growing types, which spread a thick foliage only a few inches above the ground, are especially effective around small homes. Plan views of such plantings are shown in the keyed drawings. Usually, tall-growing shrubs are planted in the background and the lower varieties in the foreground in those arrangements where close grouping is necessary. Where shrubbery borders a walk, driveway or a terrace stairway, those bordering the stairway should be of the low-growing



Here a planting of alternate shrubs of different heights and varieties is especially effective in screening a large entryway



Above and below, two examples of plantings of evergreens and deciduous shrubs arranged to achieve the more rambling outline found in nature. As you can see, both are effective







Large trees growing alone are always attractive features of landscaping on large or small lots

varieties, all specimens being of equal age at the time of planting. Where the stairway leads from a lower to a higher level of the garden or lawn and not directly into the house, the lower-level terminal planting usually is a low, spreading evergreen, the spreading junipers being especially suitable. At the top of such an arrangement the stairway row planting may properly terminate in a single taller specimen on each side. When making any closely grouped planting requiring the use of duplicate specimens, be sure that the duplicates are of the same age.

Border plantings, on the other hand, should not achieve the more geometric symmetry required near a building. In-



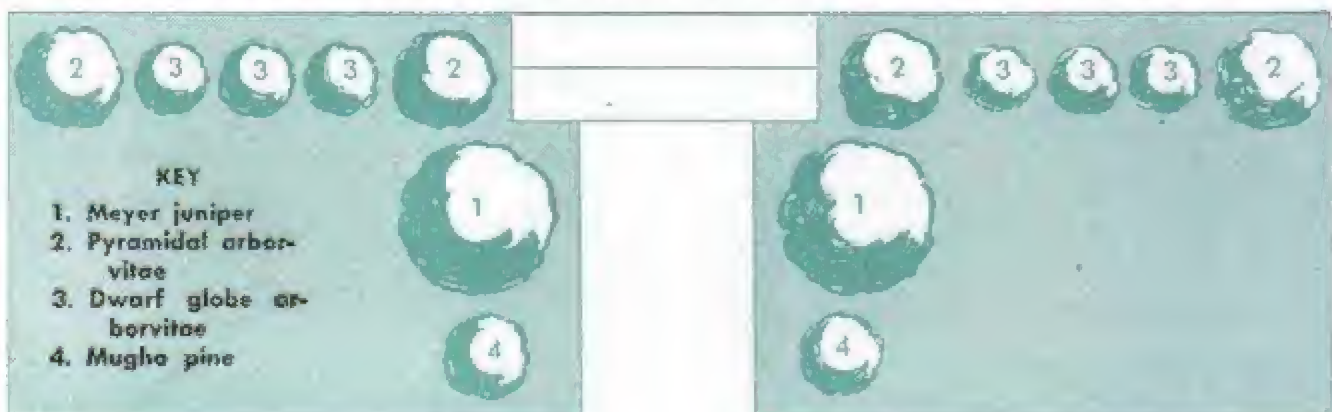
#### KEY

- 1. Globe arborvitae
- 2. Pyramidal arborvitae
- 3. Dwarf junipers

stead they should show the rambling outline often found in natural surroundings. The one exception, perhaps, is a hedge which also serves as a boundary between two properties. Here the planting should consist of individuals of a single variety of the same size and age.

Often, on both large and small grounds, a single large specimen growing above in the open, best serves the purpose of landscape decoration. Two examples are shown in the photos. Such solitary individuals usually will more or less take care of themselves in the matter of growth habit, after rerooting in the new location. They will require very little training or pruning. It pays to buy balled stock for both individual plantings and also for the larger specimens in a group planting. When

When making a landscape plan, number the duplicate shrubs of a given variety. Where there are duplicates in a single group or in adjacent groups, it's quite important that the duplicates be of the same age and training







Such a planting as this ornamental hedge calls for a single variety of plants of the same age, all planted at the same time

planting balled stock buy from a reputable nurseryman and follow his instructions to the letter. Uninterrupted growth is practically certain with this procedure. Balled evergreens should be at least 3 years old. The 5-year specimens of most varieties of evergreens cost more but these have had the benefit of two or three years training in the nursery.

Smaller specimens dug from the nursery row are supplied with open-root systems packed in damp moss. These should be handled with the greatest care after unpacking to prevent the roots from drying out before the shrubs can be planted in a permanent location. If there are a number of shrubs such as a single lot of one variety for a long hedgerow, all those which cannot be planted immediately after unpacking should be "heeled" into moist soil. To do this dig a V-shaped trench in the garden and lay the shrubs side by side against one side of the trench with the roots at the bottom. Cover the roots and trunks some distance above the ground line with soil and pack it lightly. Soak the trench thoroughly. When you remove the shrubs from the trench, or the original packing, place the roots in a pail or tub filled with water.

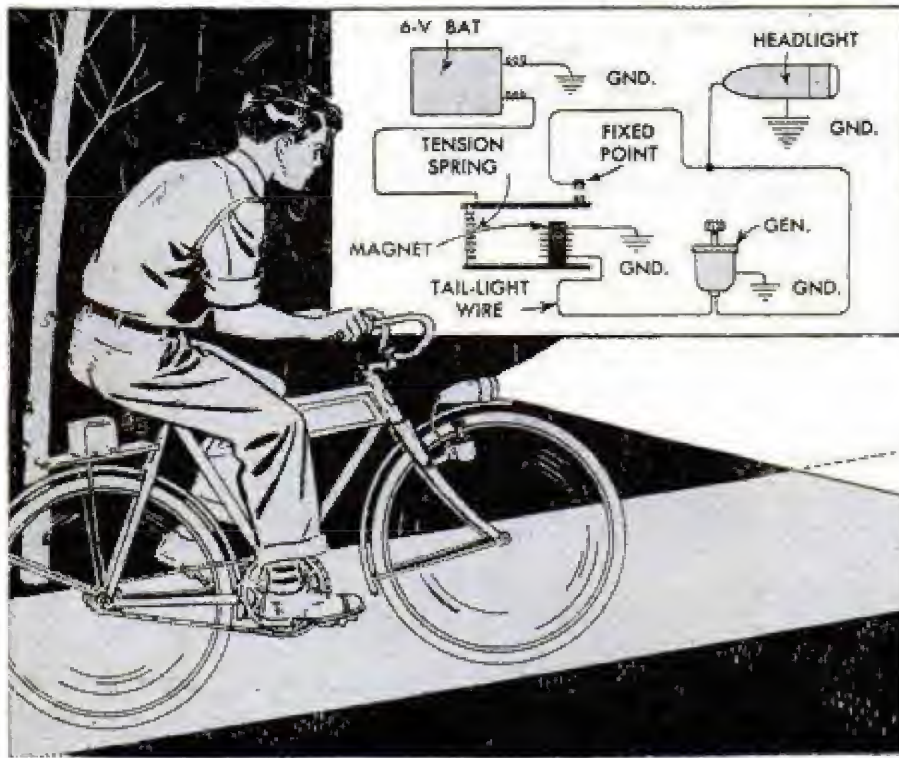


Above, the precise lines of this border hedge guide the caller directly to the building entrance. A well-kept hedge like this is an asset to any property. Below, here again the decorative value of a large single specimen is demonstrated. Many low-growing varieties attain maximum size only when planted alone





# Generator-Operated Bicycle Light Stays Bright

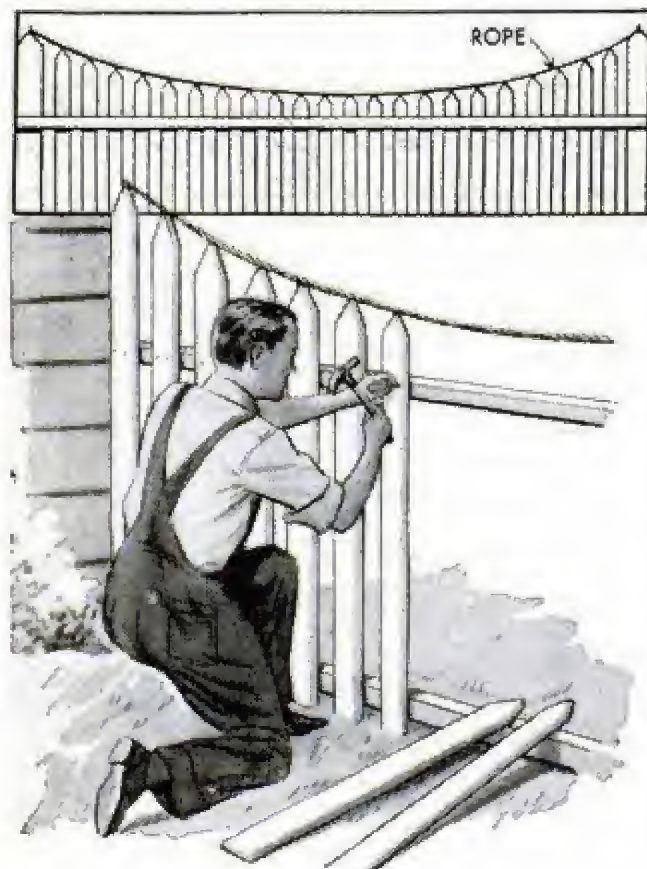


Generator-operated bicycle headlights will remain at constant brilliance when the bicycle is stopped, or slowed down to climb a hill, if a 6-volt dry battery and an automotive-type relay are wired into the circuit as shown. The relay cuts in the battery when the generator current drops. The points of the relay will have to be reversed, and when doing this be sure to insulate the fixed point from the relay case. Also, make certain that the armature and battery-lead connection is insulated from the relay tension spring. — Luther E. Brown, Spangler, Pa.

## Clothesline Used as Height Gauge in Building Scalloped-Top Fence

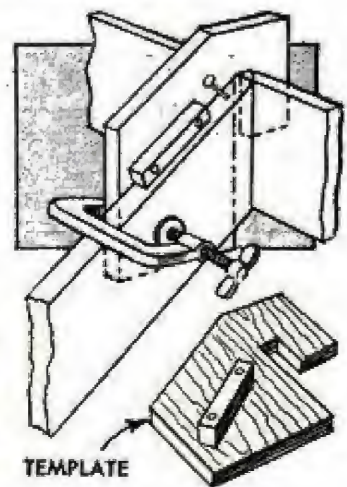
To simplify the job of marking and nailing the pickets to the crossrails of a scalloped-top fence, one man suspended a length of rope between the two end pickets of each section and used its natural curve as a guide. He first set the end pickets for height by holding a straightedge and level across the top and then drove a nail in the top end of each picket for at-

taching the rope. The rope not only served as a guide for marking the pickets for length, but was used to line up the tops of the pickets as each one was nailed to the fence rail. The same depth of scallop is maintained for each section by setting all end pickets an equal distance apart and using the same length of rope between the pickets. — Sven E. Siemen, Harvard, Mass.



## Rafters Erected Singlehandedly With Aid of Wooden Hook

Normally, raising and nailing rafters is a job for two men, one to hold the rafter at the ridge and another to hold it at the plate. However, the job can be done easily by one man if this simple wooden hook is used. It is clamped temporarily to the rafter to permit hook-



ing the plank over the ridge board. Cut the hook from plywood and notch it to suit the thickness of the ridge board. The cleat, which automatically aligns the hook on the rafter, is located to correspond with the roof pitch. The hook also can be used to mark the rafter plumb cut.



# "Spatterprint" Silhouettes Have Unusual Finish

If you are looking for something unique in the way of decoration for wall prints, album covers, bridge tallies, etc., then try "spatterprint" silhouettes. They are simple to make and require few materials. A cigar box with the top and bottom removed, some screen wire, thumbtacks and a toothbrush are all that are needed. To make the frame, tack the screen over the top opening of the box. Then select a pattern for the silhouette. This can be a pressed leaf, a design cut from a magazine or any other suitable subject. Lay this on a piece of heavy paper and place the frame over it. Dip the toothbrush in poster paint or liquid shoe polish and, after shaking off the surplus, rub the brush across the screen until the desired depth of color is obtained. Let dry before removing pattern.



## Animated Monkey Slides Down Pole to Amuse Small Children

Watching the monkey literally "jump" down the pole will amuse youngsters by the hour. The toy is made from a  $\frac{1}{4}$ -in. dowel, a length of stiff wire and a wooden

cutout of a monkey. A portion of wire is formed into a coil spring by winding it around a  $\frac{5}{16}$ -in. metal rod. Wound over a form of this size, the spring will be a loose fit on the dowel. The cutout is attached to the projecting end of the wire, and a wooden block serves as a base to support the pole vertically. To operate the toy, place the coiled end of the spring supporting the monkey over the top of the pole, give the monkey's head a flip to set up a vibration and he will slide down the pole in a very realistic manner.



## Shoe Eyelets Serve as Portholes For Ship Models

Neat portholes for ship models are made easily by using shoe eyelets. Drill holes for a snug fit in the side of the ship and drive in the eyelets. Place a small block of soft wood over the eyelet when driving it to avoid damage. Use a metallic-type paint to finish each porthole.—Harry E. Vandryes, Jr., Kingston, Jamaica, B. W. I.



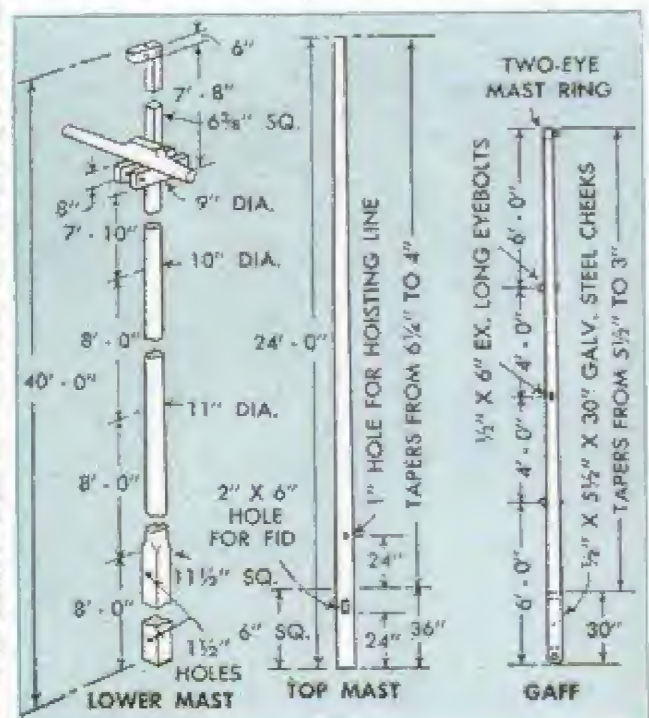


# STRICTLY

By W. Mack Angas

This 55-ft. signal mast provides for the correct display of flags ashore by yacht clubs, boat clubs and other nautical organizations. The national ensign is flown from the peak of the gaff and all lesser flags from the masthead and yard. Although it is common practice to fly the yacht ensign from the gaff, as shown in the photo, this is not strictly correct procedure.

For the lower mast, a 12 by 12-in. seasoned Douglas-fir timber, 40 ft. long is required. Or, you can use a 40-ft. pole having a minimum diameter at the butt of 14 in. Note that the upper part of the mast is square and has a 6-in. tenon which carries the cap. If a round pole is used, the lower 8 ft. should be shaped 11½ in. square with an adz. The round, tapered portion of the pole is then worked down to the diameters specified. The mast support is built up of two 6 by 16-in. timbers, 14 ft. long. After the pieces are cut to size they are clamped to the butt of the mast for boring bolt holes through both the butt and the timbers in alignment. The timbers and spacer blocks should be pressure treated with a wood preservative to protect them against dry rot and termite attack. The topmast, gaff and yard are Doug-

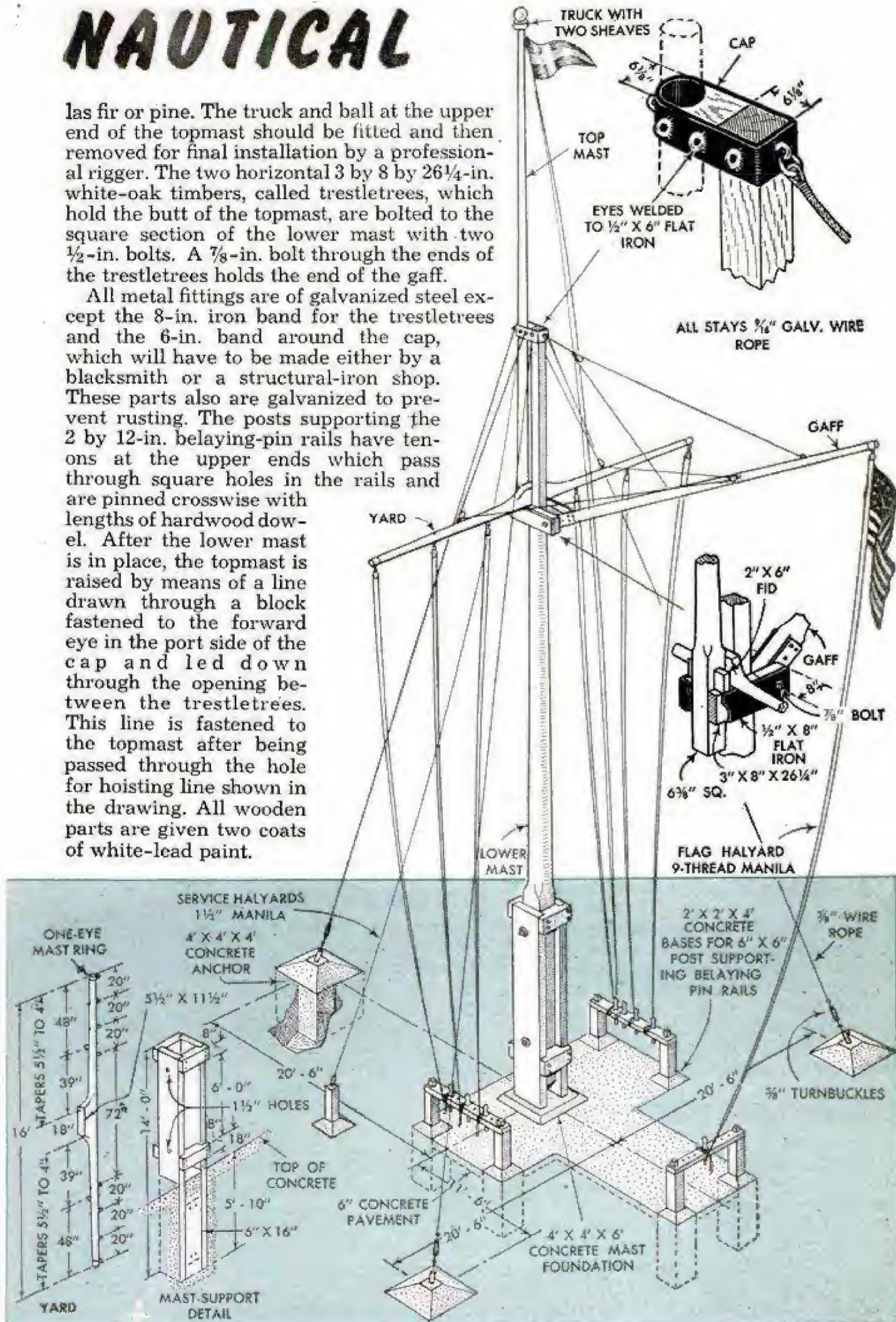




# NAUTICAL

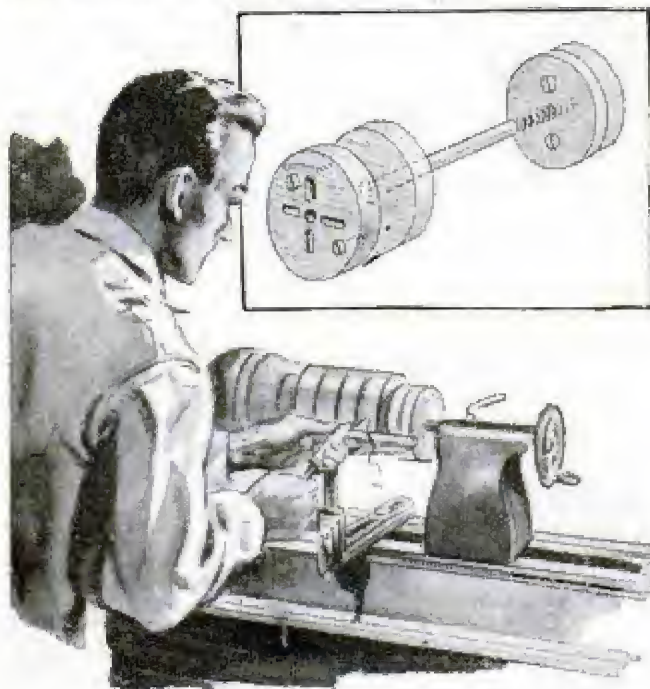
las fir or pine. The truck and ball at the upper end of the topmast should be fitted and then removed for final installation by a professional rigger. The two horizontal 3 by 8 by 26¼-in. white-oak timbers, called trestletrees, which hold the butt of the topmast, are bolted to the square section of the lower mast with two ½-in. bolts. A 7/8-in. bolt through the ends of the trestletrees holds the end of the gaff.

All metal fittings are of galvanized steel except the 8-in. iron band for the trestletrees and the 6-in. band around the cap, which will have to be made either by a blacksmith or a structural-iron shop. These parts also are galvanized to prevent rusting. The posts supporting the 2 by 12-in. belaying-pin rails have tensions at the upper ends which pass through square holes in the rails and are pinned crosswise with lengths of hardwood dowel. After the lower mast is in place, the topmast is raised by means of a line drawn through a block fastened to the forward eye in the port side of the cap and led down through the opening between the trestletrees. This line is fastened to the topmast after being passed through the hole for hoisting line shown in the drawing. All wooden parts are given two coats of white-lead paint.



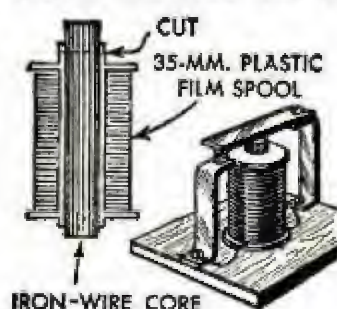


## Mandrel Permits Multiple Turning Of Wooden Toy Wheels



When duplicate wooden wheels are needed, such as those for toys, they can be turned four or more at a time by mounting them on this improvised lathe mandrel. The mandrel consists of four disks, three being of wood and the other of metal, and a machine bolt. The bolt should be the same size as the axle of the toy and of a length that will make the distance between the jaws of the mandrel slightly greater than the combined thickness of the four pieces of work. The head of the bolt is held between two wooden disks, one of which is drilled through the center and countersunk for the bolt head, and the other screwed to it as shown. The metal disk,  $\frac{1}{8}$  in. thick, is drilled and tapped for the threaded end of the bolt and, in turn, is screwed to a wooden disk. Drill a hole half-way through the wooden disk for the end of the bolt. Finally, mount the mandrel between centers and true up the jaws. In use, the work is drilled to fit the bolt, then roughly cut to size and mounted and tightened on the bolt by turning up the jaw on the end of the bolt. The whole assembly is replaced in the lathe, using the original spur and tail center marks.

## Coils Wound on Film Spools

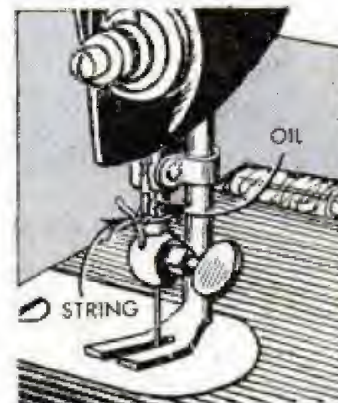


If you wish to make a small electromagnet for a relay, the plastic spool from a 35-mm.-film cartridge provides an excellent form. Drill out the thin

web in the end of the spool, insert short lengths of soft-iron wire for the core, and cut off the top end as shown. Then, drill a hole in a wooden base to hold the electromagnet in place. These plastic spools also are suitable forms for winding radio coils and resistors.—Henry Zave, Chicago.

## Cotton String Absorbs Excess Oil From Sewing-Machine Head

To prevent oil from spotting material after a sewing-machine head has been lubricated, tie a short length of cotton string tightly above the needle bar, as shown in the drawing. The string will absorb the excess oil and prevent it from



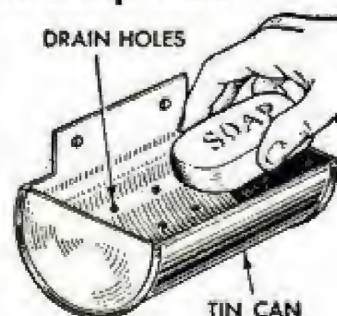
seeping down to the cloth. Check the string occasionally and, when it appears to be saturated with oil, replace it.

## Uses for Toothbrush Containers

Instead of discarding plastic toothbrush containers, put them to use either as decoration or for utility. For example, if decorated with decals and fastened to the molding or walls with cellulose tape, they make attractive bud vases. In the nursery they are useful containers for swabs. They also serve as a protective cover for scissors, and in the kitchen they can be used to protect the blades of sharp knives.—Edward B. Tunstead, Minneapolis, Minn.

## Tin Can Serves as Soap Dish

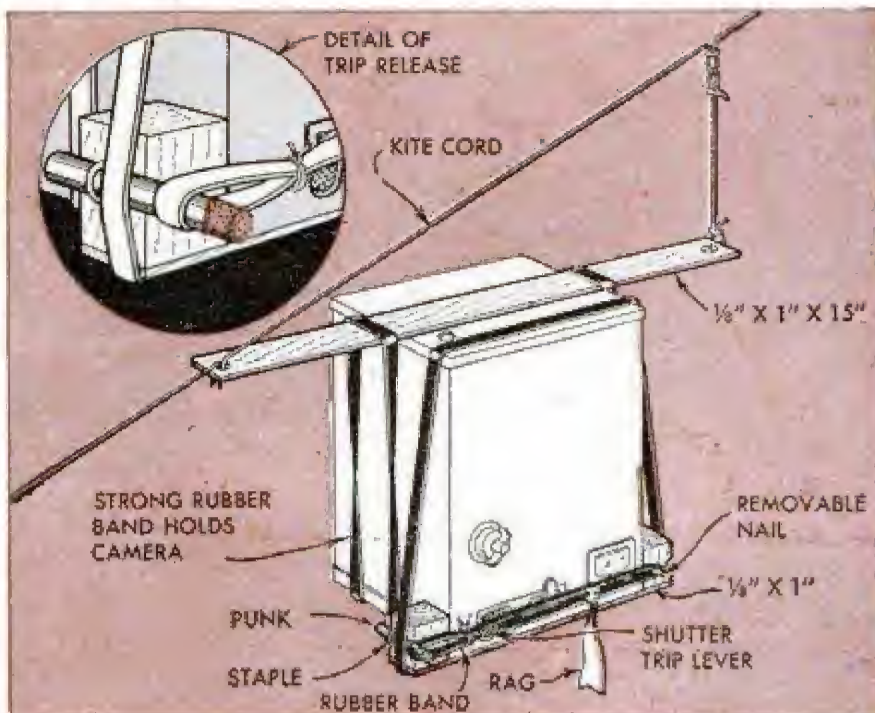
For use in the shop or basement where appearance is not too important, a handy soap dish is made from an ordinary tin can. Obtain a fruit-juice can from which the top has not been



removed, and cut it in half lengthwise, leaving a tab on one side as shown. Dull the sharp edges of the metal with a file, and then drill or punch several drain holes in the can and holes in the tab to fasten it to the wall. If you prefer, leave off the tab and punch holes through the ends of the can to suspend it with wire between two faucets.—A. E. Fenn, Chicago.



# Low-Altitude Aerial Photos Taken From Box Kite

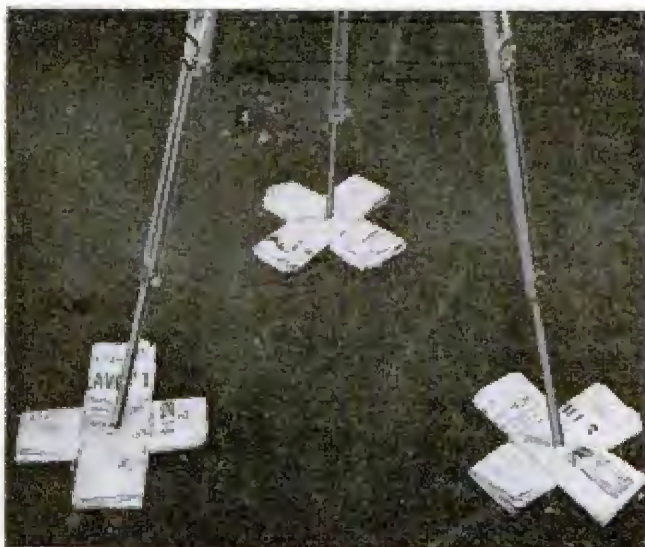


Here's a novel way to take clear aerial photos of homes in your neighborhood with the lowest possible investment in practical aerial photo equipment. Any kite capable of lifting an ordinary box camera in light to medium winds, will do. An automatic shutter-release mechanism consisting of two small wooden blocks, two rubber bands and a piece of punk of the kind used to ignite fireworks, is attached to the camera. Then the assembly is fastened to the kite cord as indicated. Note that a cord is knotted around the rubber band just behind the shutter trip lever and also that a small piece of white rag is attached to this band. In taking the picture, you ignite the punk and send up the kite with camera attached. As soon as the punk has burned sufficiently, it releases the rubber band, which trips the shutter and falls clear, the telltale cloth indicating when the shutter has been released. Remember there is some danger of fire when shrubs and grass are dry.

C. L. Meehan, Lakeview, Ont., Can.



## Newspaper Pads Prevent Sinking of Tripod Legs in Soft Ground



When shooting outdoor pictures, the legs of a tripod can be kept from sinking into soft ground by supporting them on pads of folded newspapers. Fold the papers flat as shown, and place them criss-cross under each leg.

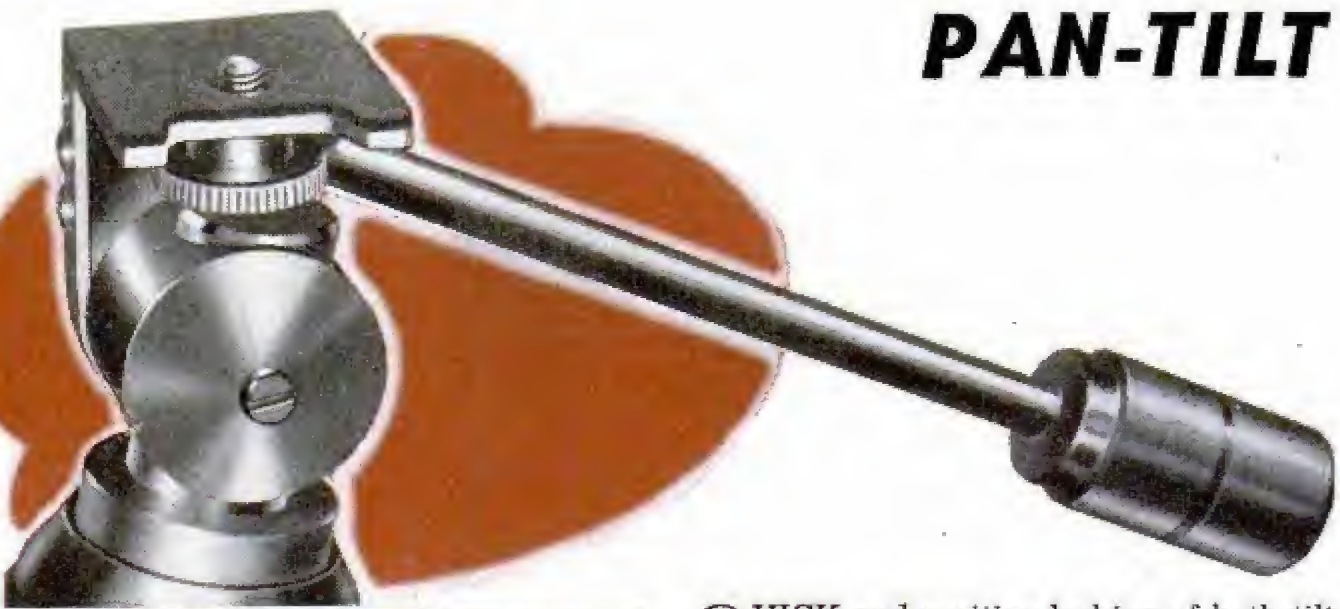
Frank P. Fritz, Cicero, Ill.

## Retarding Developer Spoilage

A partially filled bottle of developing solution will oxidize (turn brown) more quickly than a full bottle because there is more air space above the level of the solution. To retard oxidation, pour the developer from a large bottle to a small one that will be filled completely.



# PAN-TILT



With this setup, machining the arc on the saddle block is easy. Block is backed with 1/2-in. plywood

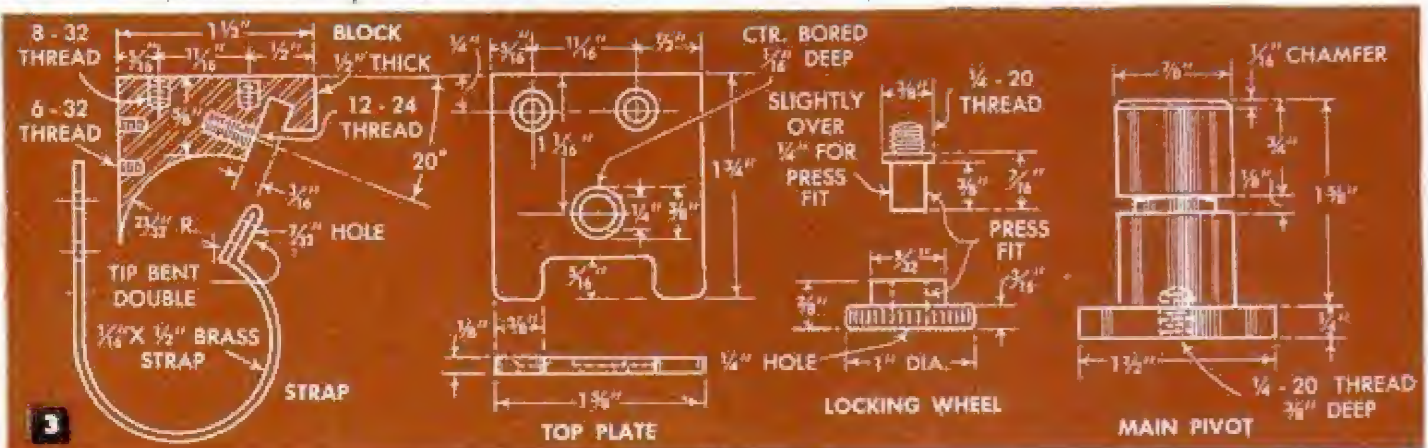


Hole in the pivot bar is bored .002 in. undersize to assure a snug fit on the main pivot after slotting

**Q**UICK and positive locking of both tilt and "pan" adjustments with a single action is possible with this tripod top. It is sturdy enough to support large view cameras, is adaptable to all standard tripods, and the smooth pan action makes it especially desirable for use with movie cameras. No castings are required.

The main pivot, Fig. 3, is turned from 1 1/2-in. cold-rolled steel. A 1/8-in. retaining groove turned in the body receives the tip of the locating setscrew that holds the pivot bar in place. The top of the column is slightly chamfered and a hole is drilled in the bottom and tapped 1/4-20 to permit mounting on standard tripods. Cold-rolled steel, 1 1/2 in. in dia., also is used for the pivot bar which has a 1/32-in. step cut 1/16 in. from the end for the clamping strap. The shoulder formed by this step keeps the tilting head in place when it is loosened for moving. The 7/8-in. transverse hole is bored in the lathe, Fig. 2. The diameter of this hole should be about .002 under that of the main pivot to assure the proper fit after slotting the bar. After boring, slot this part with a hacksaw as indicated in Fig. 3, and drill and tap for the locating setscrew. Note that the threaded end of this screw is turned down to 1/8 in. in diameter.

The tilting head consists of a saddle block and a brass binding strap that rides





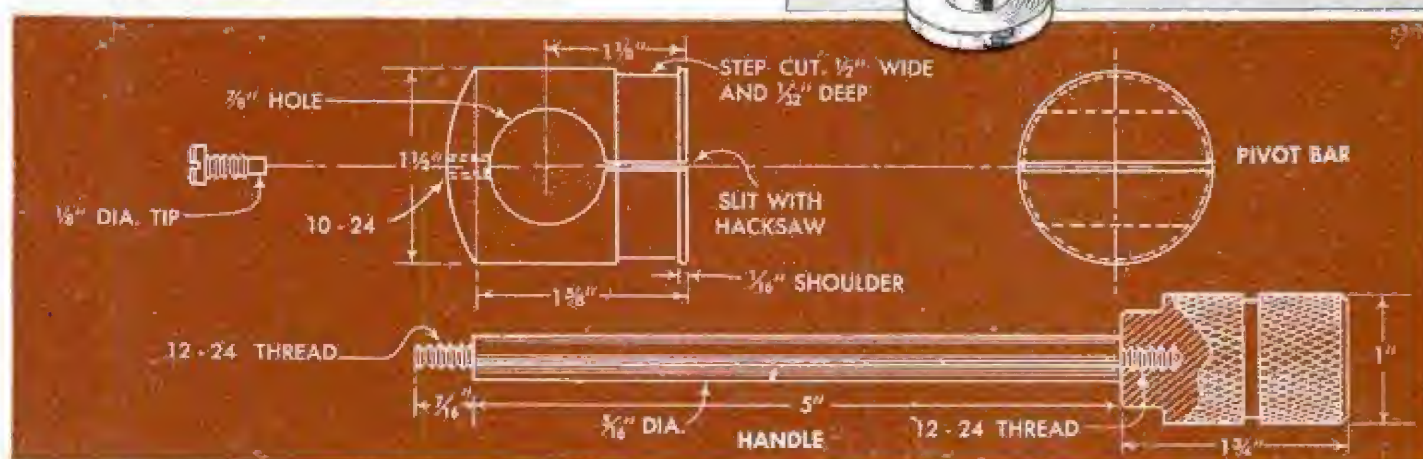
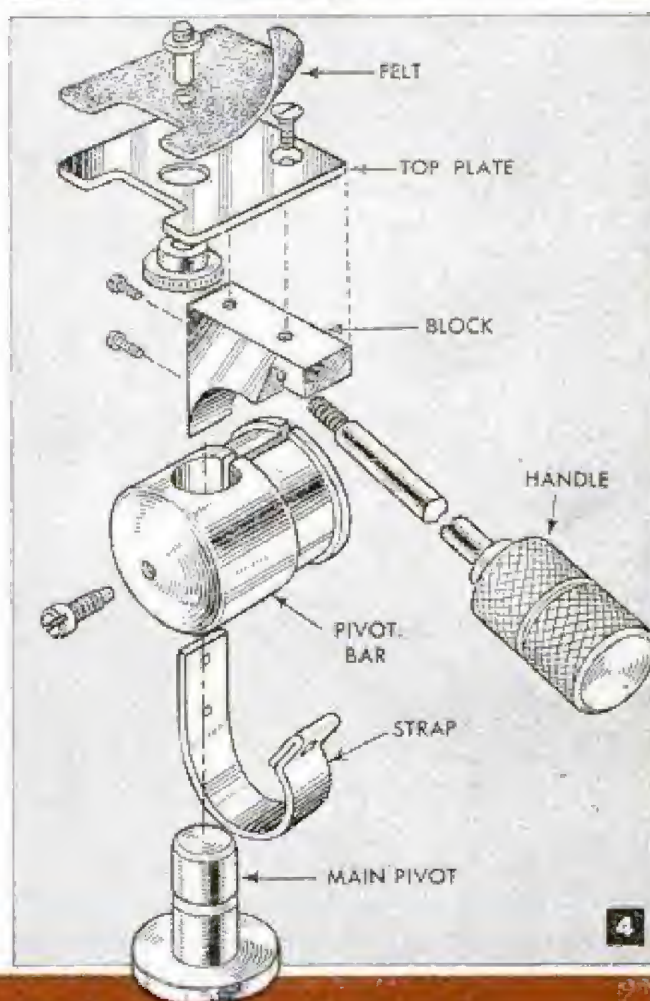
# TRIPOD HEAD

This tripod head is sturdy enough to support a large view camera. A single locking device controls both pan and tilting movements without any other adjustment

By Henry and Richard Hanscom

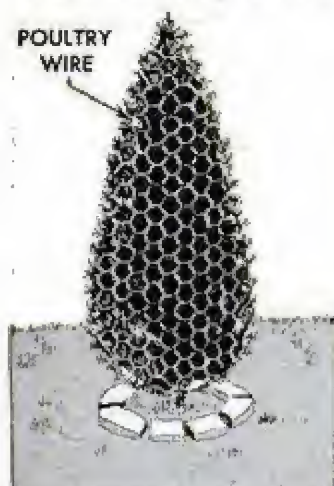
in the crossbar step and serves as a clamp. The block is machined from  $\frac{1}{2}$ -in. brass, the arc being cut on the same radius as that of the  $\frac{1}{2}$ -in.-wide step cut on the crossbar. Fig. 1 shows the setup for cutting the arc. After the arc has been cut, the block is grooved as in Fig. 3 to take the bent end of the binding strap. The shouldered end of the locking handle, Fig. 3, passes through the strap and turns into a threaded hole drilled and tapped in the saddle at a 20-deg. angle. Two 6-32 fillister-head machine screws, turning into holes drilled and tapped into the back face of the saddle block, hold the flat end of the binding strap. The locking handle, which is threaded to fit the 12-24 tapped hole, is used to hold the strap in position while it is bent to shape. Holes are marked while the strap is held tightly in position and then are drilled and tapped for short screws. The handle is in "release" position to allow for proper tightening of the strap.

A brass top plate is fastened to the saddle block with two flat-headed cap screws. Note that the plate is counterbored for the flanged spindle of the locking wheel, Figs. 3 and 4, and that the spindle is machined for a press fit in the wheel hub. Glue a piece of felt to the top of the plate. Although a machine finish is attractive, some builders may wish to grind and polish exposed parts of the unit. The handle, pivot bar and the main pivot can be ground smooth in the lathe and then polished on a buffing wheel. Flat surfaces are polished by rubbing on a piece of crocus cloth tacked to a flat block of wood.





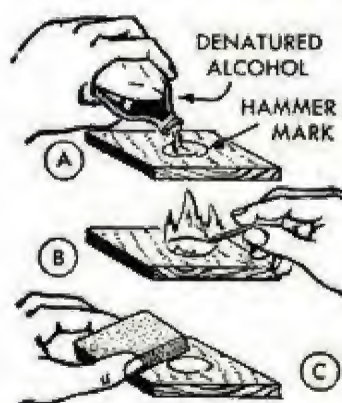
## Small Evergreens Protected With Poultry Wire



Shrubs and small evergreens will keep their shape and be protected from storm damage if they are wrapped with poultry wire. Use the large-size mesh so that the shrub will continue to grow unhampered.—Duke D'Ambra, Lawrence, Kans.

## Raising Shallow Dents In Hard or Soft Wood

Hammer marks and other shallow dents in unfinished wood, such as furniture or woodwork can be raised flush with the surface by a simple heat treatment. Place a few drops of denatured alcohol in the dent, A, ignite, B, and let burn. The combination of heat and moisture will cause the wood fibers to swell and rise to the level



of the surrounding surface. The spot then is sanded lightly, C, to remove any slight scorch that may result. This is effective only on very shallow dents and cannot be expected to raise deep depressions. Another method of raising

a dent is to cover it with a dampened cloth pad and steam the wood by applying a hot soldering iron or household iron to the cloth. This treatment also will raise the grain of the surrounding wood and it will be necessary to sand down the raised grain. To remove a dent in a surface already finished, the varnish or paint, naturally, must be scraped from the dent and adjacent area.

R. E. Murray, Fremont, Ohio.

## Handy Glue Spreader



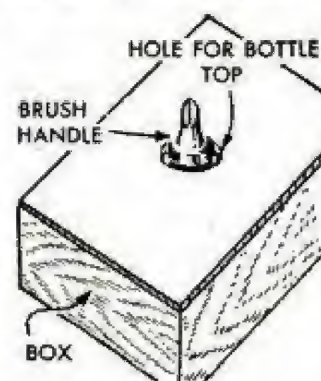
Desiring a fast way of spreading glue on narrow boards which I was laminating, I found that a piece of clock spring

made an excellent tool for the purpose. The spring was formed into a loop and the ends inserted in the end of a dowel handle. In using the tool, I poured the glue inside the loop and then moved it slowly over the work, lifting the tool slightly to leave a film of glue. A hacksaw blade can be used in this same way, the serrated edge allowing the glue to level uniformly.

Kenneth Murray, Colon, Mich.

## Bottle Holder Has Gluing Surface

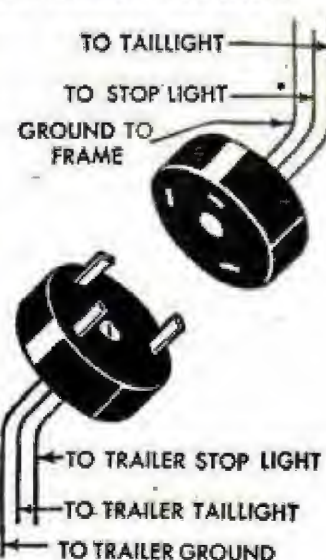
In offices or homes where mucilage is used, a glue-bottle holder can be made from a cigar box or similar container. Bore a hole in the lid of the box to permit the bottle top and brush handle to project.



Then place the glue bottle in the box and close the lid over it as shown. In addition to catching the drippings from the brush, the lid will serve as a place where gluing can be done without danger of smearing the desk or table top.—I. M. Fenn, Chicago.

## Electrical Coupling for Trailer Made From Sealed-Beam Sockets

To operate the taillight and stop light on his trailer simultaneously with those on his car, one motorist devised a convenient coupling from two sealed-beam headlight sockets. Three prongs are soldered into the slots of one of the sockets to make a plug, and its leads are spliced into the various parts of the trailer circuit as indicated.



Then, the other socket is fastened under the rear of the car with two of its leads connected into the taillight and stop-light circuits and the third lead grounded to the frame. The wires of the plug should be long enough to enable it to reach the socket, and both plug and socket should be marked plainly so that the wires leading to corresponding parts of the trailer and car circuits will be connected.

C. Buxton, Chicago.





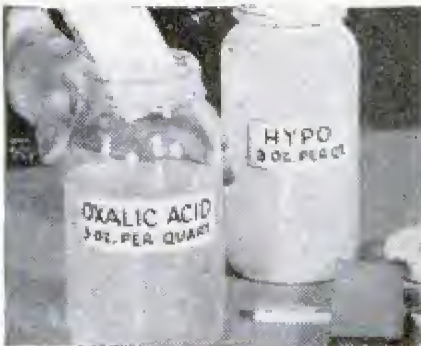
1. This bandsaw job is—  
 (a) Rabbeting (c) Chamfering  
 (b) Resawing (d) Spiling



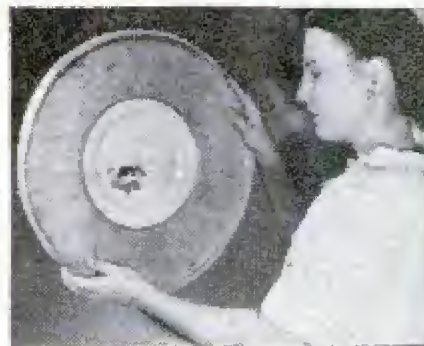
2. Metal being turned is—  
 (a) Brass (c) Mild steel  
 (b) Aluminum (d) Stainless steel



3. He is painting the—  
 (a) R.F.D. (c) LL2  
 (b) L.W.L. (d) Buttack



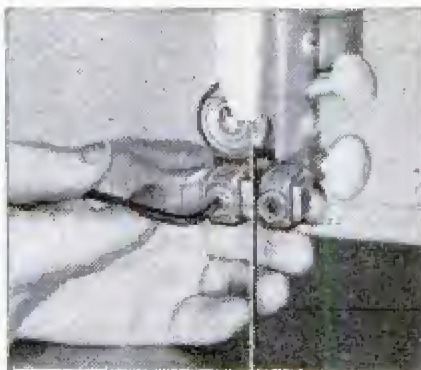
4. With this you do—  
 (a) Staining (c) Filling  
 (b) Sealing (d) Bleaching



5. Big faceplate job is turned—  
 (a) All aboard (c) Inboard  
 (b) Outboard (d) Between centers



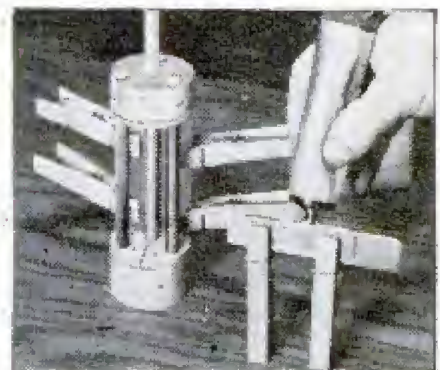
6. Sparks show this metal is—  
 (a) Aluminum (c) Copper  
 (b) Brass (d) Steel



7. He is adjusting the—  
 (a) Blade support (c) Roller guides  
 (b) Pin guides (d) Side relief



8. He is putting glue in the—  
 (a) Mortise (c) Groove  
 (b) Tenon (d) Rail



9. His hobby is—  
 (a) Archery (c) Photography  
 (b) Boats (d) Gem cutting

ANSWERS: 1-b; 2-a (other metals mentioned require positive back rake); 3-b (load water line); 4-d (oxalic acid is a mild bleach for wood); 5-b (on outboard end of headstock spindle); 6-d (others do not spark); 7-b; 8-a; 9-a (gadget shown is a feathering lig); 10-b; 11-a



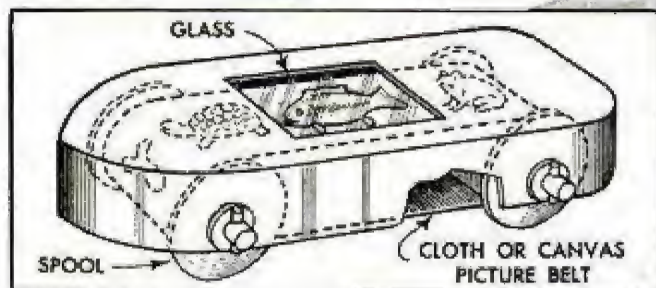
10. Yes, it writes on glass:  
 (a) Silicon carbide (c) Tungsten  
 (b) Tungsten carbide (d) Tantalum



11. Getting ready to do—  
 (a) Tumbling (c) Knurling  
 (b) Sandblasting (d) Curling



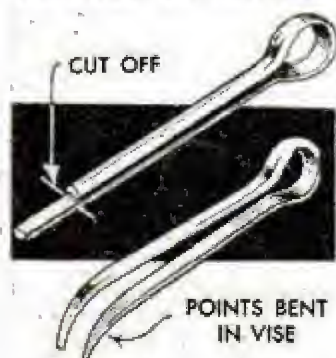
## Children's Glass-Bottom Boat Has Educational Value



Made from sheet metal cut and soldered to the shape of a boat, this novel toy will fascinate children and help teach them to identify various forms of marine life. Thread spools serve as wheels for the boat and also as reels for an endless cloth or canvas belt on which pictures of fish, frogs, turtles, etc. are pasted. A glass viewer is mounted in the center of the deck to enable the children to watch the pictures pass by as the boat is pushed along. Dowel axles pinned crosswise against washers hold the spools in place.

Ralph L. Ralston, Jackson, Mich.

## Tweezers From Cotter Pin



Cut off one leg of the cotter pin slightly so that when bent both legs will be the same length. Grind each one to a point and bend

If tweezers are needed for a particular job and none are obtainable, you can make a pair from a large-size cotter pin of the type used on heavy machinery. These are available 3 in. or more in length.

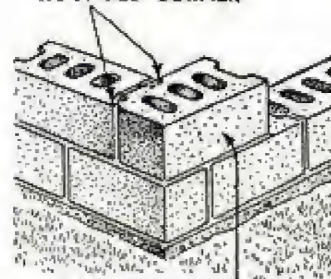
the ends as shown by clamping them together in a vise. Then force them far enough apart to obtain a spring action.

John Krill, North Lima, Ohio.

## W.T.M. Concrete Bull-Nose Concrete Blocks Take Place of Square Type

Should you run short of square-type concrete blocks or desire to make use of extra bull-nose blocks, the latter may be used at the corners of a building. Merely turn the rear side of the block to the outside and chip off the adjoining block to fit around the curved portion, as shown in the sketch. When the job is done in this manner, both the interior and exterior of the corners will appear square.

CHIPPED OFF TO MATCH  
ROUNDED CORNER



BACKSIDE OF  
BULL-NOSE BLOCK

Michael Ligoeki, Gary, Ind.

## Tape Makes Drain Plug Fit Tightly

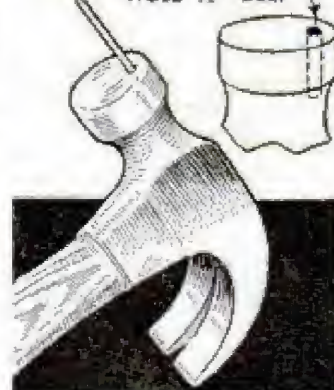
A slow leak caused by a loose-fitting drain plug in a laundry tub or wash basin can be stopped by using friction tape or waterproof adhesive tape. Wrap a few turns around the tapered part of the plug so that it is a tight fit in the drain. When wrapping the tape, have it flush with the top of the plug and trim excess width off the bottom to make a neat repair.

Chas. F. Cretien, San Diego, Calif.

## Hole in Hammer to Start Nails

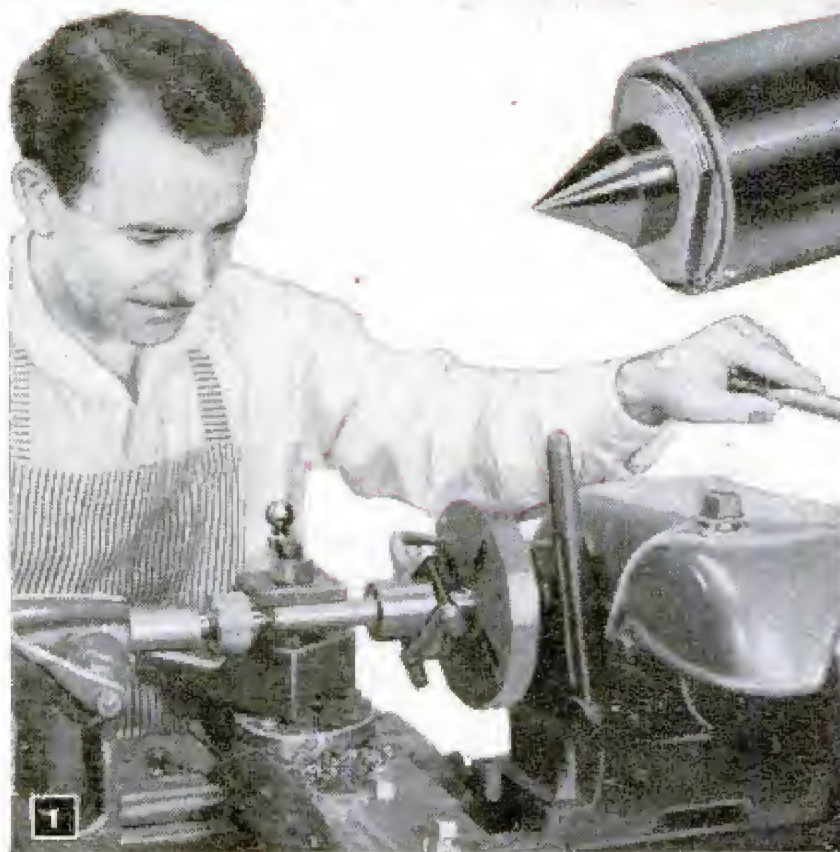
When it is necessary to hold both the stock and a nail in position somewhere overhead, or when starting a finishing nail in a spot that is hard to reach, the problem can be solved by using an old hammer that has a hole drilled in the head to hold the nail.

HOLE 1/4" DEEP



Drill the hole near the edge of the face so it will not interfere with hammering, and make it large enough to accommodate a nail of the largest diameter commonly used. To use, merely insert the nail in the hole, tap it lightly until it grips the wood, and then finish hammering in the normal manner.



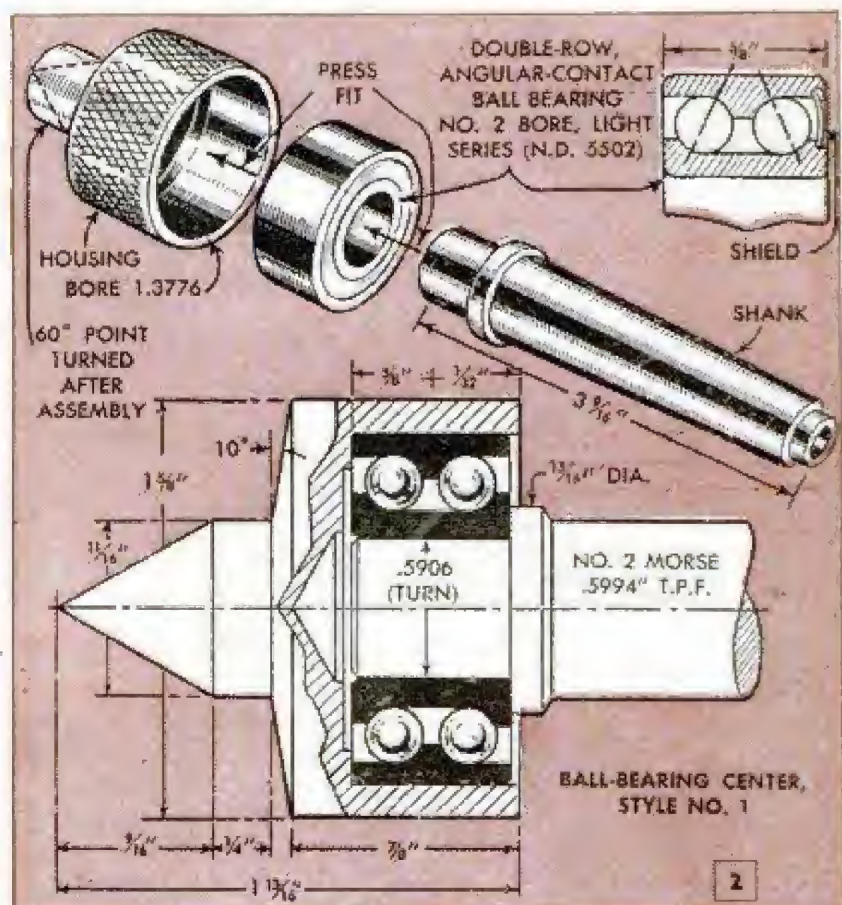


By Sam Brown

## BALL-BEARING CENTERS

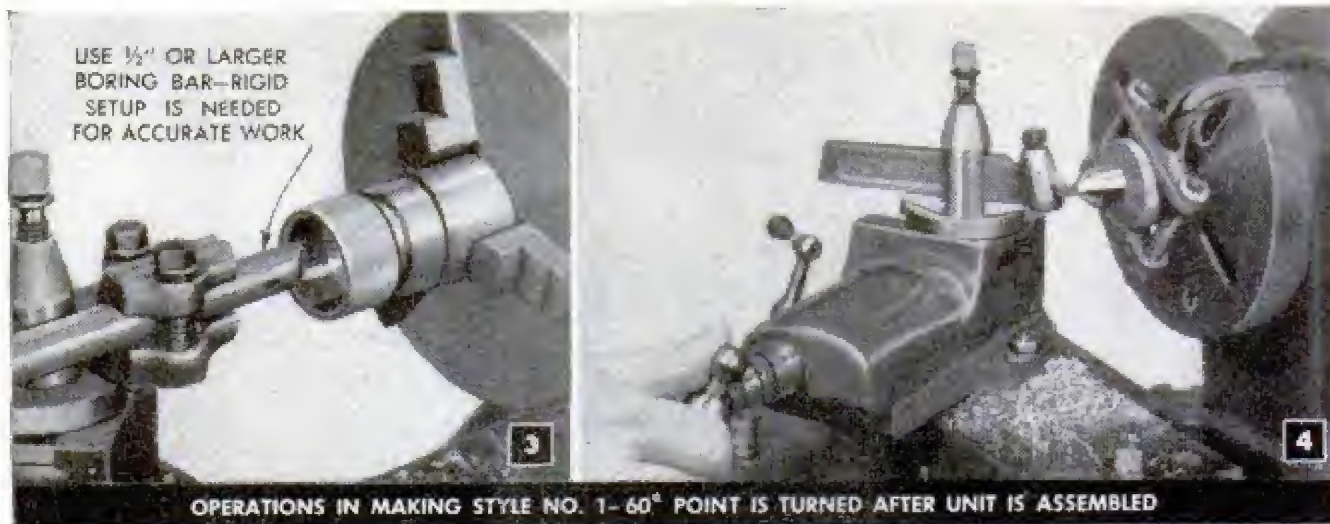
**B**ECAUSE a ball-bearing center decreases the work load and eliminates oiling, it is a practical lathe accessory. The two types described here will handle any ordinary job that requires a tail center. Bearings must be the angular-contact type specified, as the finished center cannot be made rigid enough to withstand extremely heavy cuts when an ordinary, radial-type bearing is used.

Fig. 2 shows construction of style No. 1. The center point and housing are turned in one piece from a length of  $1\frac{3}{4}$ -in. cold-rolled steel. First turn the housing to the outside diameter and then knurl. With the same chucking, bore the inside of the housing, Fig. 3.



Of the two types given, the center detailed above is the easier to make. Although nonadjustable, it is as rigid as the adjustable one. Both types provide interesting projects in precision lathe work

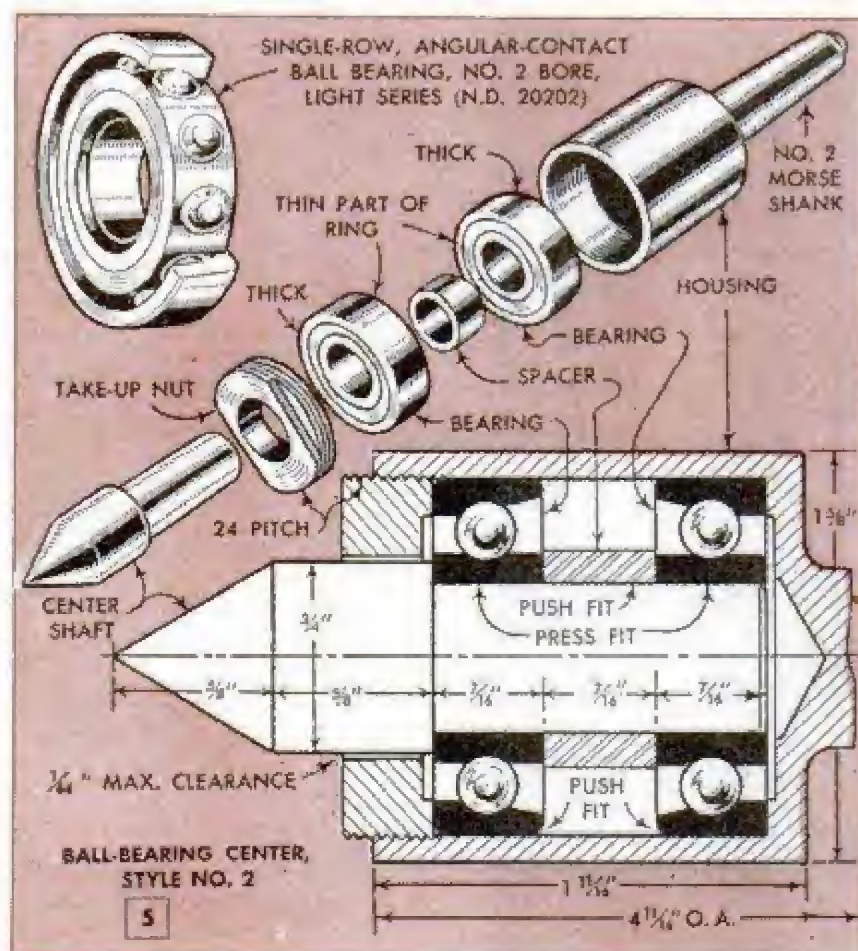




Boring requires precision work, so use the largest boring bar you have and make the final cuts with a feed of .002 in. per revolution. If you have had no experience with fitting ball bearings, it is worthwhile to turn a plug gauge .0004 in. less than the diameter of the bearing. When the gauge is a snug slide-fit inside the bored hole, you will know that the bearing will be a press-fit. Then rough-turn the center point. The shank can be turned with a taper attachment or by offsetting the tail center. However, it is possible to purchase Morse No. 2 shanks ready-ground. Fig. 4 shows how the 60-deg. point is finish-turned after assembly, using the compound slide.

Style No. 2 makes use of two single-row, angular-contact bearings of No. 2

bore, but No. 16 separable-magneto bearings, which also are the angular-contact type, are equally good. The general construction of the center is shown in Fig. 5. It will be noted that this center has a take-up nut for preloading, whereas the double-row bearing used for style No. 1 is factory preloaded. Start by turning the Morse-taper shank and housing from one piece of 1 $\frac{3}{4}$ -in. cold-rolled steel, Fig. 1. Test it for fit in the tailstock spindle at an early stage by chalking the work and noting where the chalk rubs off. After the shank is turned, it is mounted in the headstock spindle for boring the housing, Fig. 6. Run in a light relief cut before threading it for the take-up nut. The bearings for this center should be a snug fit in the housing. Fig. 7 shows



STYLE NO. 2 — BORING THE HOUSING



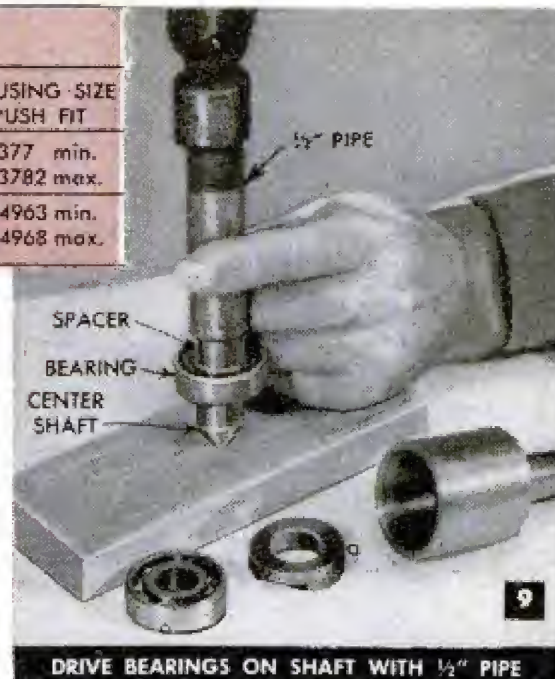
TURNING THE CENTER SHAFT



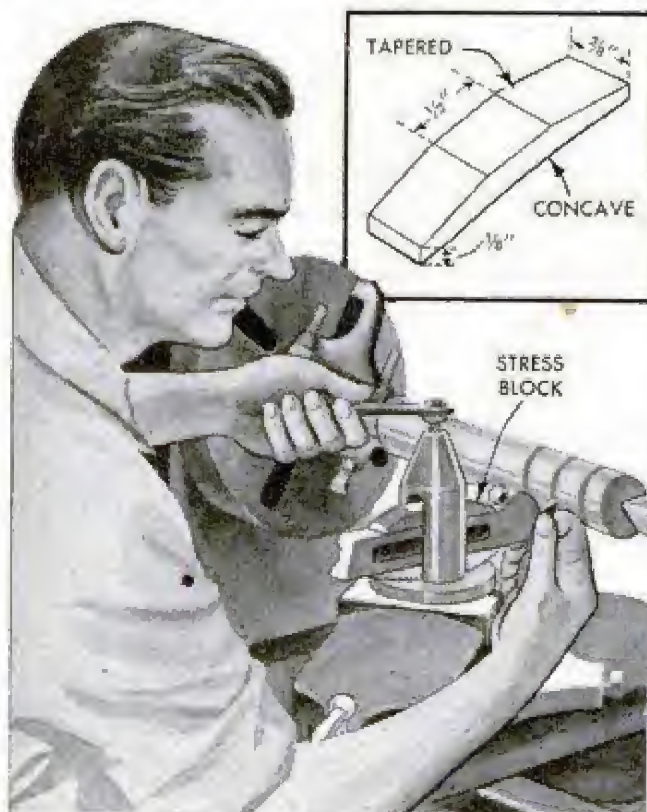
8 BALL-BEARING DATA					
	BEARING BORE	SHAFT SIZE PRESS FIT	BEARING DIAMETER	HOUSING SIZE PRESS FIT	HOUSING SIZE PUSH FIT
NO. 2 BORE LIGHT SERIES	.5903 min. .5906 max.	.5905 min. .5908 max.	1.3775 min. 1.3780 max.	1.3771 min. 1.3776 max.	1.377 min. 1.3782 max.
SIZE 16 MAGNETO	.6296 min. .6299 max.	.6298 min. .6301 max.	1.4961 min. 1.4966 max.	— —	1.4963 min. 1.4968 max.

the center shaft being turned. The 60-deg. point is rough-turned at this stage and finish-turned when the unit is completed, Fig. 10. The center is locked in place by turning the takeup nut. Fig. 9 pictures the assembly. A short section of  $\frac{1}{2}$ -in. pipe, faced at one end, makes a good driving tool for a bearing having a No. 2 bore. If the bearings are heated by placing them on a 60-watt lamp for about  $\frac{1}{2}$  hr., they will expand slightly and slide on the shaft easily. Heating the housing in the same way also will simplify assembly. Use a soft-grease packing in assembling both units. Except for the knurled surface, all parts of the centers can be given a high polish while they are chucked by using fine emery cloth dipped in oil and holding it against the work.

In making either style of center use utmost care in boring the housing and turning the center shaft. The table, Fig. 8, gives the minimum and maximum size of manufactured bearings, and the minimum and maximum diameters of work for press and push fits. It will be noted that tolerances must be held to a .0002 or .0003-in. limit. Ten-thousandths can be measured with an ordinary micrometer by dividing the small divisions by eye. Each small division, of course, represents .001 in.



## Steel Stress Block Rides Holder in Tool Post to Reduce Bit Chatter



Precision lathe work such as finish-turning, boring and thread cutting to close limits makes it necessary to clamp the tool holder rigidly in the tool post to avoid chattering. In most cases, merely tightening the clamping bolt will not prevent this, because pressure from the bolt is centered only on a small area of the tool holder. However, this trouble can be corrected by using a stress block between the holder and the end of the clamping bolt to exert pressure over a greater area and consequently lock the holder rigidly in position. Naturally, the dimensions of the block must fit the tool post at hand; the dimensions given being for a 9-in. lathe. Make the block from tool steel and, after grinding it to the shape shown, harden it by heating to a cherry red and quenching immediately in oil. Note that the bottom of the block is slightly concave to provide a "spring" action which exerts pressure when clamped to prevent shifting due to vibration. The flat surface on the top of the block should fit the clamping bolt.



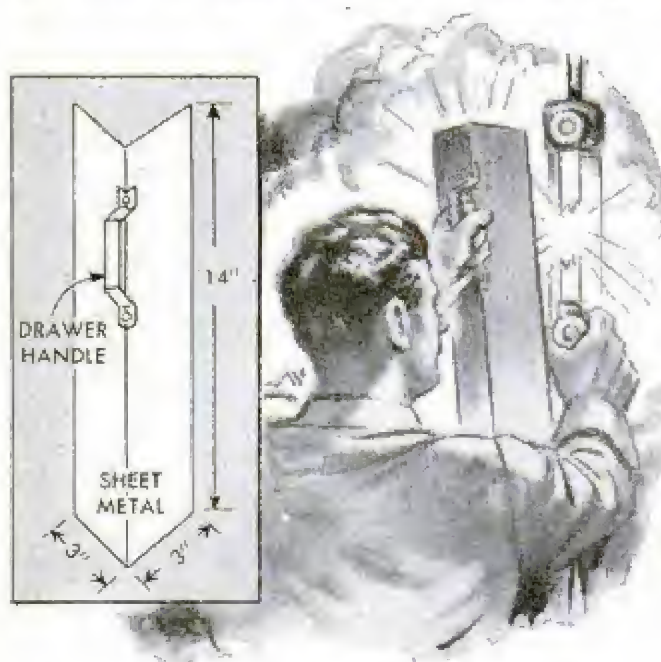
## Kinks Removed From Wire Fence With Forked Stick



One man can take the kinks out of woven-wire fence that has been crushed by snowdrifts or trampled by cattle if this method is used. Select a forked stick that is about 8 or 10 in. longer than the height of the fence and set the top strand in the crotch. Holding the stick in a vertical position, place a foot on the lower strand and use both hands to pull up on the top strand.

## Sheet-Metal Guard Shields Worker When Removing Gauge Glass

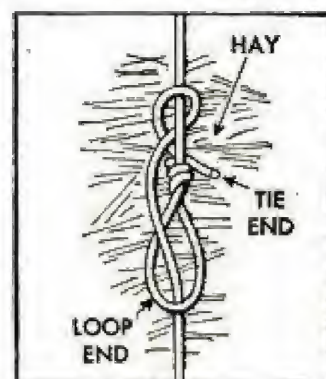
Danger of steam burns when closing shutoff valves on a gauge glass before removing it, or when working around connections from which live steam may escape, is lessened if this sheet-metal guard is used. It is made by bending a rectangular piece of sheet metal to form a right



angle and attaching a drawer handle. Make the unit according to the dimensions given, or even larger, to afford ample protection. Wrap the handle with cord or other insulating material to protect the hand.

## Baling-Wire Knot is Nonkinking

Many farmers who bale hay for home use follow a method of tying knots in baling wires which later eliminates straightening kinks in the wires if they are to be used again. As shown in the drawing, the knot is made by inserting the tie end through the loop, but instead of bringing it back on itself as in regular practice, the end is simply given one turn over the loop end.

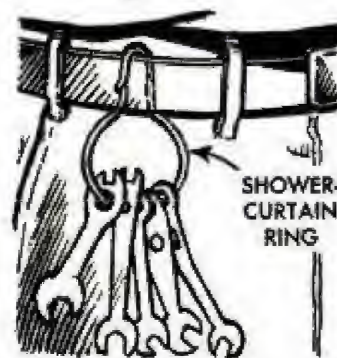


## Sloping Floor in Farrowing House Protects Infant Pigs

Because the foundation of a farrowing house settled, causing the floor to slope, a method was discovered to prevent a sow lying upon and crushing young pigs. It was found that the sow always preferred to lie with her back toward the high side of the floor. Newly farrowed pigs do not move about much during the first few days of life and, due to the sloping floor, they cannot climb and get into a position where they might be crushed. Experiment has shown that a floor slope of about 1½ in. to 1 ft. works well. The floor of any portable house can be slanted by blocking.

## Small Ignition Wrenches Carried On Shower-Curtain Ring

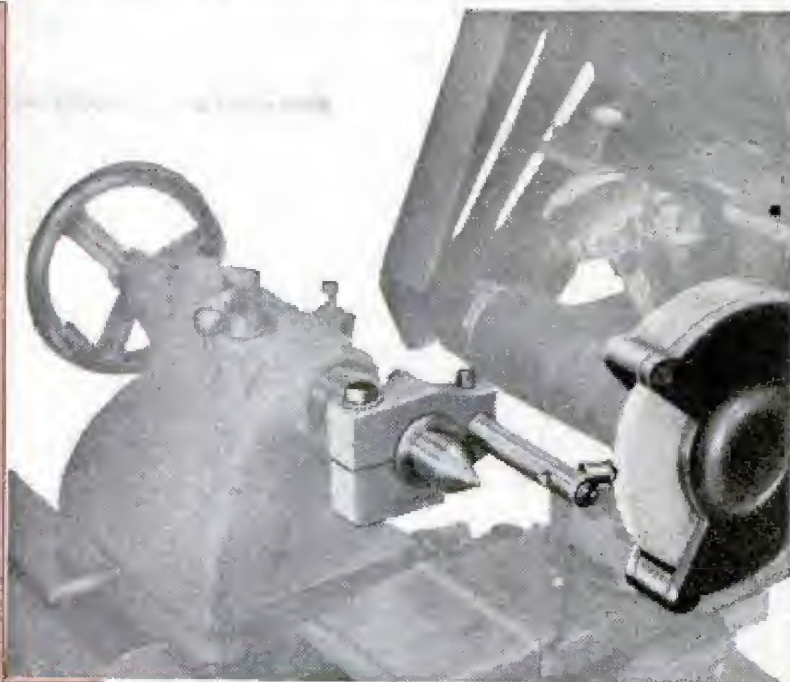
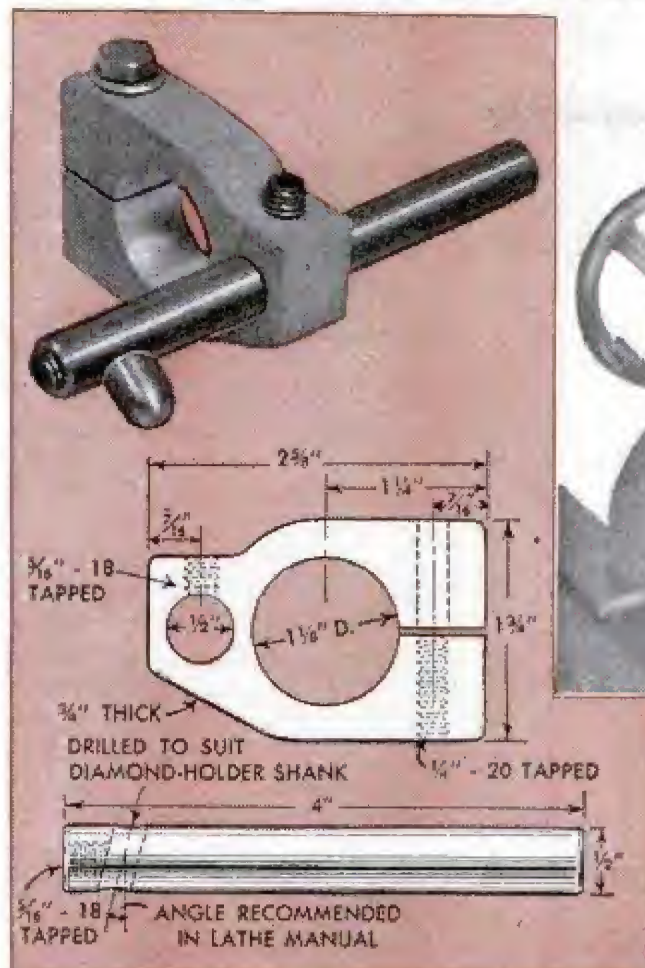
Sets of small combination wrenches for ignition work are carried easily on a shower-curtain ring attached to your trouser belt. If you prefer not to carry them in this manner, the ring may be hung on a nail within easy reach of the workbench or kept in a toolbox. A snap or key chain will serve the same purpose. Such a holder also is handy for carrying a small assortment of washers or nuts.



Charles H. Hardy, Los Angeles, Calif.



# Grinding-Wheel Dresser Rides Lathe Tailstock



Designed to clamp on the tailstock spindle and support a diamond-tipped grinding-wheel dresser, this handy lathe attachment is especially useful in truing wheels on a tool-post grinder. Mounted in this manner, the dresser can be left undisturbed in any set position to maintain the same wheel-to-work angle each time the wheel requires dressing.

The attachment consists of a simple clamp-type holder which can be a casting or machined from  $\frac{3}{4}$ -in. steel or brass plate. In either case, the holder is chucked and lathe-bored to fit over the tailstock

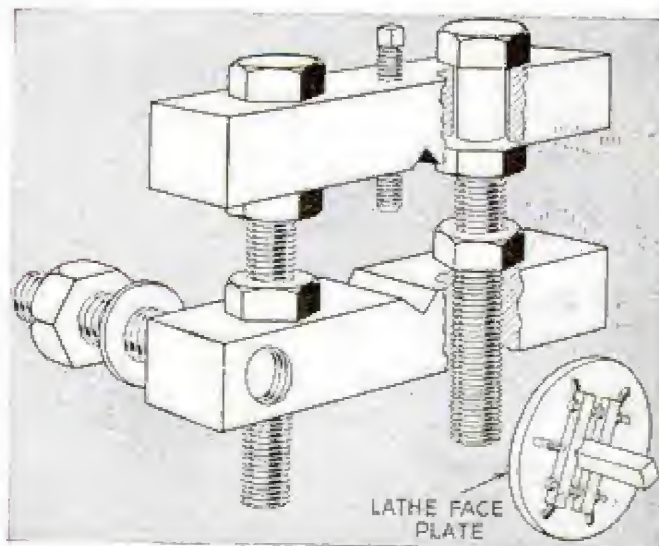
spindle, the lathe shown requiring a  $1\frac{1}{8}$ -in. hole. Then a slot is made in from the edge to meet the hole. This permits take-up on the holder when clamping it to the spindle with a cap screw. Note that the slotted end is counterbored for the screw with a clearance hole in the upper half and a tap hole in the lower.

The extension arm is  $\frac{1}{2}$ -in.-dia. cold-rolled steel and is locked in the holder with a socket-headed setscrew. The angle of the hole which is drilled crosswise through the arm to receive the shank containing the diamond tip, can be 15 to 30 deg. This is not critical, although the type of diamond tip used determines the amount of angle necessary to permit rotating the tip to expose a new cutting edge when the diamond wears. The end of the arm is drilled and tapped for a socket-headed setscrew which locks the shank of the diamond tip in place. In use, the wheel is moved past the diamond dresser.

## Driving Dog for Faceplate Work

To simplify and speed the operation of mounting and driving duplicate work on a lathe faceplate, I made this simple driver to replace the regular faceplate dog. It is bolted to the faceplate and has two adjustable jaws to accommodate both round and square stock of various sizes. Once adjusted to suit the work at hand, the driver permits subsequent pieces of work to be chucked rapidly merely by inserting between the jaws and clamping with a lock screw. The jaws are of square cold-rolled steel, V-notched, drilled and tapped for two cap screws and the locking screw.

Francis McCartin, Schenectady, N. Y.





# FINISHING

Although floor finishing on old or new work is one of the simplest wood-finishing jobs, the process calls for careful attention to details. Here are ways of making old floors new, and new floors better

*By Charles H. Leach*

**F**INISHING either old or new hardwood floors requires the same procedure except that on an old floor you sometimes add one more step, that of removing the old finish. Some finishers take off the old varnish first with a paint and varnish remover. This will save time when sanding floors which have been varnished several coats. However, in most cases where the floor has been finished in the usual way, removal of the varnish before sanding is not necessary. The first step on either old or new floors is to smooth and fill the bare wood. On new floors this should be done before the floor has been walked on or exposed too long to changes of temperature and humidity. Dust, which settles and becomes embedded in the open grain of the wood by the action of moisture darkens the surface.

**Sanding:** On both new and old floors the edges of the boards will be slightly raised, due to shrinkage and also the clearance in the joints. This wavy surface



With an edger like this one you can sand the floor clear to the baseboard. Machines of this type are available at most hardware stores on a rental basis



On nearly every floor there will be some spots you cannot reach with the sander, near drain pipes and in corners. Finish such places by hand with a scraper



# FLOORS

can be noted by passing the palm of your hand over the floor. Although these raised places can be removed with a hand scraper as was the regular practice in older methods, a much faster way is to go over the floor with a sanding machine.

There are several types of sanding machines available on a rental basis and you will need two of them. The drum-type machine, Fig. 1, is used for preparing the open area of the floor to within 2 or 3 in. of the baseboards, while the disk-type edger, Fig. 2, is designed to finish this remaining strip. It is best to remove the shoe mold before using this machine. If there are radiators in the room, these also should be taken out. Remove the finish from an old floor with a coarse abrasive on the sanding drum. Then use a medium grit for smoothing out the scratches left by the first abrasive and finally finish with a fine-grit abrasive. On a new floor in good condition, the coarse sanding is not necessary.

In the operation of these machines, it is essential to keep them in motion while the abrasive is in contact with the floor. Otherwise the abrasive will dig in. Speed of movement over the floor is not as important as uniformity. When operating the drum-type machine keep it in motion and raise the drum from the floor when you reach the baseboard. Roughing (first sanding) can be done in any direction, with the grain or across the grain. Most floor finishers run the machine at an angle of 45 deg. for the first sanding, as shown in Fig. 1. The rough sanding removes the old finish and evens up the individual floor boards. When finishing with the medium and fine abrasives, sanding is always done with the grain. Use coarse, medium and fine disks on the edger also, so that you get the same uniformity of finish all the way to the baseboards.

**Scraping:** There are always some spots you cannot reach even with both sanding machines, such as around radiator pipes, sink drains, and a small area in each corner of the room that the shoe mold will not cover. Here the old finish must be removed and the wood smoothed with a hand scraper, Fig. 3. Care must be taken when scraping around water pipes, as the wood is nearly always discolored. It's important to remove all this discoloration as otherwise it will show up with greater emphasis when the floor is finished.

**Dusting:** When the floor has been thoroughly sanded and scraped, dust off all window stools and frames, all doorframes,



The filler should be reduced with turpentine to a light, creamy consistency. Stir thoroughly to dissolve all lumps, and stir the mixture occasionally while using

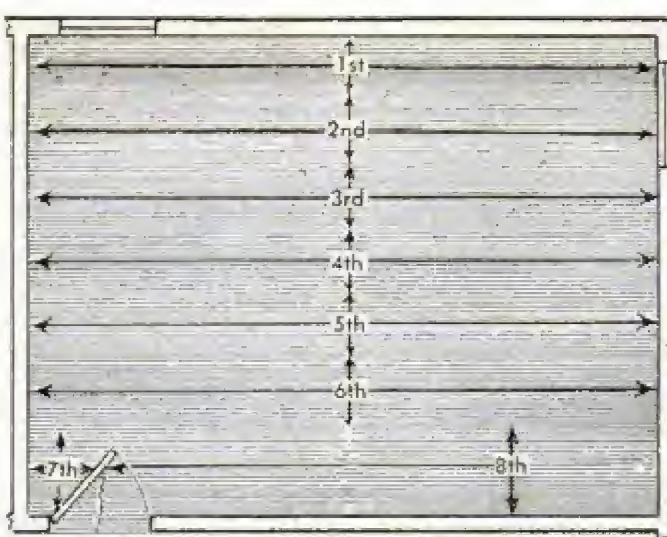


Some finishers apply the filler with the grain as shown; others insist that it is better to apply it across the grain, as this method promotes greater absorption



Filler should always be rubbed in across the grain with a coarse cloth. Double the cloth several times to make a soft pad which will pick up excess material





Above and left, apply sealers and varnish with long strokes, using a wide, well-filled brush. Begin in the corner farthest from the door and apply a strip about 2 ft. wide all the way across the room. Finish to the door with successive varnished strips of equal width

doors and baseboards. Use a painter's tack rag for this as it picks up dust without scattering it about. Dust the floor thoroughly with the same cloth. Frequent dusting while the finishing process is going on is important. If light dust accumulates in the room air movement may dislodge it. Floating dust particles always settle on the freshly varnished surface, and cause flecking and spotting of the finish.

**Filling:** All porous woods must be filled. Some finishers prefer to apply a light oil stain before filling, to give the floor an even color tone. Others mix the stain with the filler. On a new floor this latter method is faster and gives good results, but on either old or new work, the former method generally is considered the best practice. In either case, a small quantity of stain is added to the filler, Fig. 4, to prevent it from lightening the natural color of the wood after application. Filler should be applied with a brush, in the direction of the grain, as in Fig. 5, and then rubbed crosswise of the grain with burlap or other coarse cloth, as in Fig. 6. Continue rubbing until the filler begins to set or flatten, which it will do after a few minutes. Keep the excess material wiped off as you go along. A few drops of turpentine on the cloth will help to remove excess filler that sticks tightly in spots. After applying, allow the filler to dry for 24 to 36 hours. Then go over the floor with fine steel wool, rubbing at an angle with the grain, to remove all traces of filler that have hardened on the surface.

**Varnishing:** Although not necessary, it's best to first cover your shoes with cloth boot socks before you step on the floor. A smudge from a rubber heel is difficult to remove. Next, apply a floor sealer with a

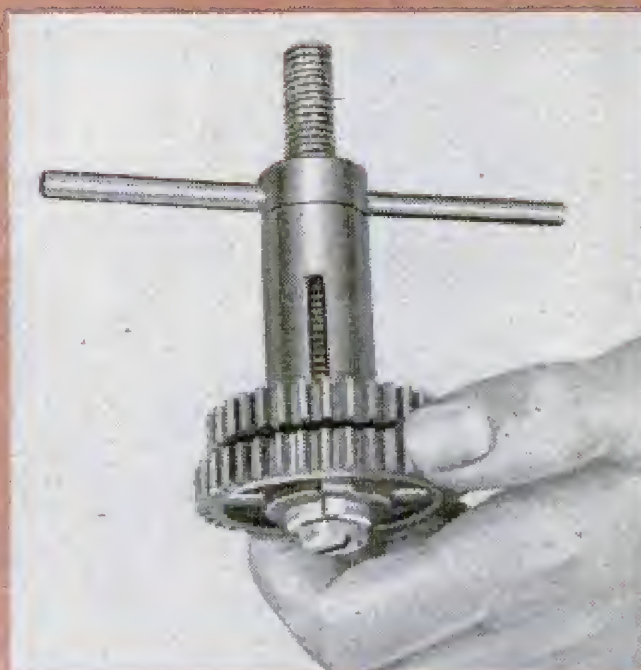
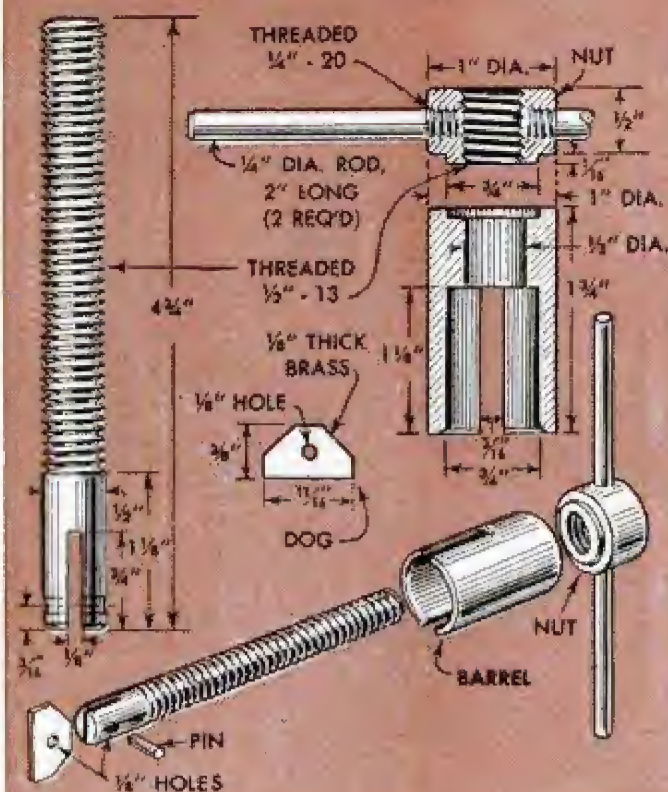
wide brush. Start in a corner and work a strip from one side of the room to the other, Fig. 7, laying on the material with a full brush and with the grain of the wood. After allowing this coat to dry in a temperature of 68 to 70 deg., smooth with fine steel wool and dust thoroughly. Follow with one coat of high-grade floor varnish. Flow on the varnish coat with a full brush, covering narrow strips successively, as in the detail at the right of Fig. 7. Finish up at the door. Allow this coat to dry for a longer period than the first, and then smooth again with fine steel wool. If, after drying, the floor shows a dull spot here and there where the wood grain has taken up the finish, you will need to apply a third coat. Usually, however, one coat of sealer and one of varnish are ample on a well-filled floor.

**Waxing:** Wax protects against scratches because it provides a "slip" surface. Grit, shoe nails, toys or other sharp objects tend to slide over a waxed surface without gouging or scratching. However, a rubbed and polished wax coating is slippery and rugs placed on such a floor may be the cause of injury to someone from falling. Avoid this danger by using a "self-polishing" wax which gives a pleasing gloss without being slippery.

Don't wax the floor immediately after the varnish is dry. Allow at least two weeks, although more time is better. If a paste wax is used, apply it to the sealed floor in thin applications with a cloth pad. Two light coats of wax are easier to polish than one heavy coat. Like sanding machines, wax-polishing machines are available on a rental basis. Some polish with a rotating brush, others with a cloth belt.



## Bushing Puller Makes Gear Changing Easy



By altering dimensions, this bushing puller can be made up for a wide range of sizes. It gives a straight pull that does not damage the work

On some change-gear lathes it is necessary to pull the bushings of individual gears when making setups for various carriage speeds and for thread cutting. To speed up this job and also to avoid any danger of damaging the parts, make the handy bushing puller, detailed above. It is dimensioned for lathe-gear bushings having a  $\frac{3}{4}$ -in. outside diameter and a  $\frac{1}{2}$ -in. bore. By altering dimensions of the barrel and the threaded puller rod, the tool can be made to fit bushings of other sizes and types. The barrel is turned from cold-rolled steel. The rod must be slightly smaller in diameter than the bore of the bushing and the barrel must be bored

slightly larger than the outside diameter of the bushing. Slots in the barrel allow keys on the lathe-gear bushings to pass but for straight sleeve bushings the slots are not needed. The rod is turned from  $\frac{1}{2}$ -in. steel shafting and threaded with a  $\frac{1}{2}$ -13 thread. The unthreaded end is slotted to receive a brass dog pivoted on a pin to allow it to pass through the bushing. Brass or bronze is used for the nut, which is turned with a  $\frac{1}{16}$ -in. shoulder to seat in a counterbore as shown. To use the puller, the nut is turned back on the rod, and the rod, with the dog in the folded position, is passed through the bushing. Then turn the dog to engage the end of the bushing.

## Index Mark on Compound Slide Shows Maximum Cross-Feed Limits

Accidentally backing a compound slide off the feed screw on a metal-turning lathe will not happen if a white index mark is painted on the saddle and the bottom slide of the rest to show the operator the maximum length of the thread. Run the cross-feed out to the limits of the thread before marking. This makes it easy to prevent running out the saddle too far by merely watching the marks and stopping when the two are aligned. This idea is especially helpful when a beginner is unfamiliar with the compound slide. If you wish, the index marks can be made by applying narrow strips of adhesive tape instead of paint to the saddle and bottom slide.





## Practical Steel Foot Scraper Utilizes Old Wagon Wheel



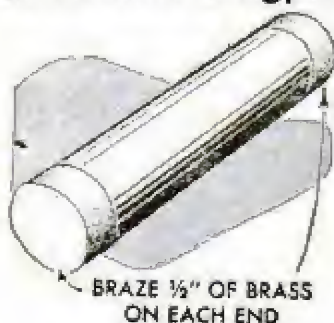
There's good use to be had from that old steel wagon wheel rusting away behind the barn. Place it near the porch steps or by the rear entrance, give it a coat of paint and you'll have an excellent foot scraper. A stake through the hub will anchor it.

## Dealer Furnishes Bulletin Board As Service to Customers

As an added service to his customers, one feed-and-seed dealer mounted a bulletin board in his store to be used by people in the community to post "For Sale" or "Wanted" items. The service is free and has a double purpose in that it brings people into the store and builds up good will among potential customers. Users of the board take care of removal of the signs when they are no longer needed.

LeRoy Lincoln, Minneapolis, Minn.

## Soft-Nosed Punch Improvised From Auto Kingpin



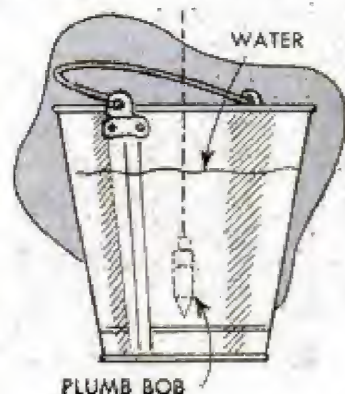
Needing a soft-nosed punch or drift to drive a threaded axle, I made one from an auto kingpin. Being made from hardened steel, the kingpin will withstand ham-

mering, and by building up a 1/2-in. thickness of brass brazing rod on each end of the pin, I obtained a soft head that would not damage the work. Where a punch of greater length is needed, two or more kingpins can be brazed end-to-end, after first chamfering the abutting ends.

John A. Stankiewicz, Louisville, Ky.

## Pail of Water Steadies Plumb Bob When Working in High Wind

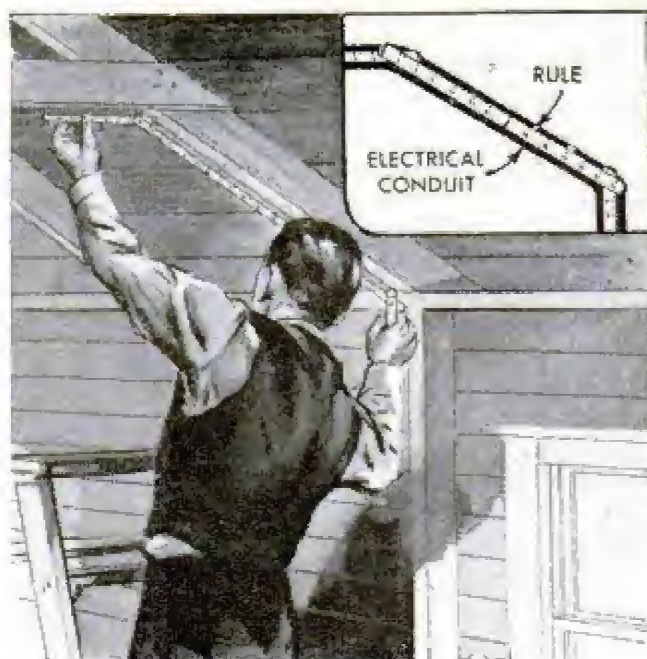
If you are working in a high wind, a plumb bob and line will remain fairly steady when the bob is immersed in a pail of water. If a pail is not available, shelter the plumb bob and string from the direct action of the wind by standing a wide board on the windward side or by blocking the wind with your body.



Charles Lothardt, Baltimore, Md.

## Zigzag Rule Is Substitute For Contour Gauge

When wiring my garage recently, I found that a carpenter's folding rule of the zigzag type was just the thing to determine the shape to bend the conduit. After adjusting the folding sections of the rule to conform to the wall, I used it as a contour gauge and bent the conduit accordingly. The same idea can be used to determine the amount of offset in a water pipe.—E. W. Moses, Jr., Blacksburg, Va.



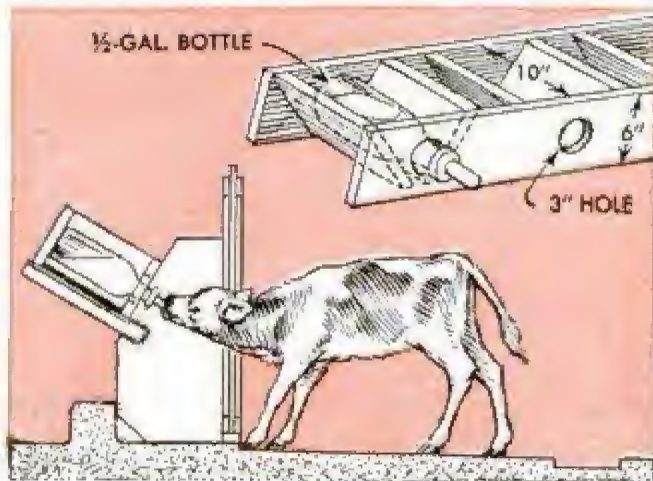


# Bottle Feeder Weans Calves at an Early Age

Farmers and dairymen will find this calf weaner a real timesaver. A simple bottle rack, designed to hold either six or twelve  $\frac{1}{2}$ -gal. bottles, is mounted on the feed-trough side of a row of specially made stanchions, Figs. 1 and 2. When the nursing calves have finished, the bottles are removed from the rack, which then can be lifted off the feed trough. Stanchions are graduated in size from 4 to  $5\frac{1}{2}$  in. Baby calves start in the smaller stanchions and are moved to the larger sizes as they grow. In this way calves can be weaned from milk to dry feed in a much shorter time. As shown in Fig. 2, the feed trough is fitted with metal partitions, which are attached to the stanchion frames with bolts.

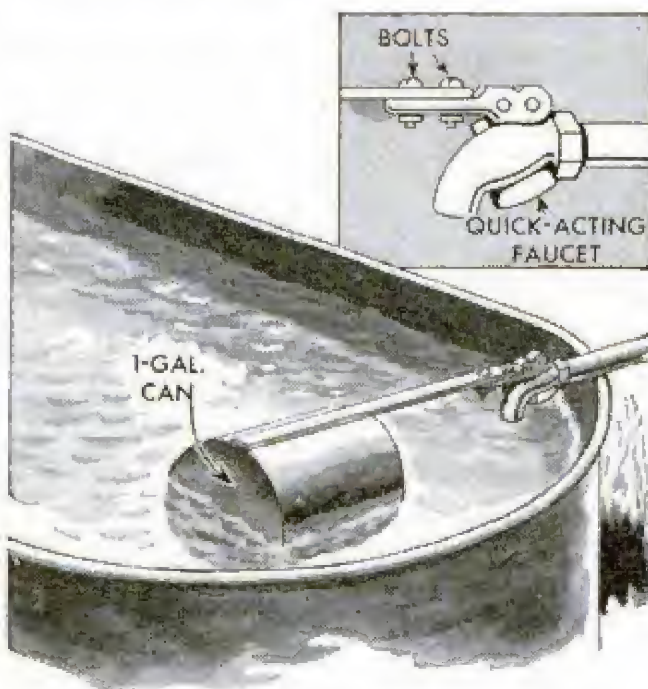


Above, calf nursing from  $\frac{1}{2}$ -gal. bottle in same position as it would from mother. Below, front view of stanchions with bottle rack in place. Note partitions



## Water Level Maintained in Livestock Tank With Automatic Control

Although use of a float-and-lever mechanism to control flow of water is not new, here's an application of the idea that will automatically keep a watering tank filled



at a constant level and save many a trip to the tank to turn the faucet on and off. Principal parts of the mechanism are: A 1-gal. can, flat-iron lever and a quick-acting faucet of the type that opens when the handle is depressed. Seal the can so that it does not leak and solder it to one end of the lever. Then bolt the other end to the faucet handle and test for operation. It may be necessary to shorten or lengthen the lever somewhat to secure proper balance so the weight of the can will open the faucet as the water level drops. After the unit is assembled and operating satisfactorily, paint it to prevent rusting. Although not shown, a guard bolted to the tank, covering the float and faucet, will protect it from damage by livestock.

Herbert E. Fey, New Braunfels, Tex.

☐ Shorten the center tine of a three-tine pitchfork to about 7 in., leaving the outside tines 1 in. longer, dull the points slightly by grinding them round and you will be able to handle bundles of cornstalks almost as easily as bundles of grain.

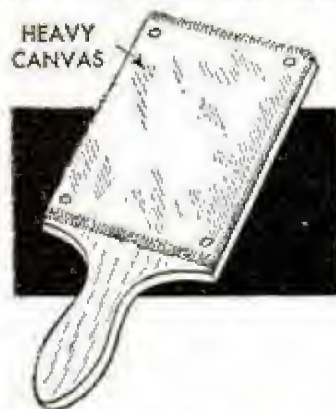


## Worker Wears Checkered Cap To Indicate Deafness



In one shop, workers who have defective hearing wear special checkered caps. These serve as a warning to crane operators, truck drivers, etc., that a sound audible to most people cannot be heard by a worker wearing the cap. Other shop hands warn the hard-of-hearing person of the approach of cranes and trucks. Often it is possible to assign such a worker to a part of the shop where the traffic is not heavy.

## Heavy Canvas Cleans Eraser



While cleaning the pencil smudges from a large drawing after inking, one draftsman found that he could clean his eraser thoroughly by rubbing it on a piece of heavy canvas. Obtain a small piece of canvas and mount it on a paddle board. This will hold the canvas taut and make it easy to locate when needed. If you wish, drill a hole in the handle to permit hanging.

Francis A. Moore, Rochester, N. Y.

## Sticks Made From Solder Scraps

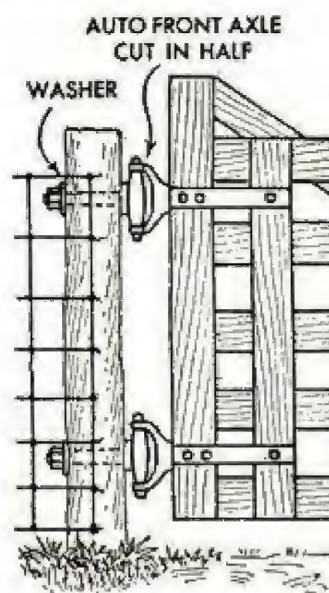
Neat solder sticks can be made from scraps of solder by using a sheet of corrugated cardboard for molds. Each corrugation serves as a "mold" or tube for an

individual stick. After the sheet has been cut so there are enough molds of the proper length, seal one end of each corrugation with putty and form a V-shaped trough at the other end for pouring the metal. This is done by spreading the flat part of the sheet and making a putty dam at each end. Pour the metal and, after it has cooled, remove the cardboard.

M. R. Thornburg, Whittier, Calif.

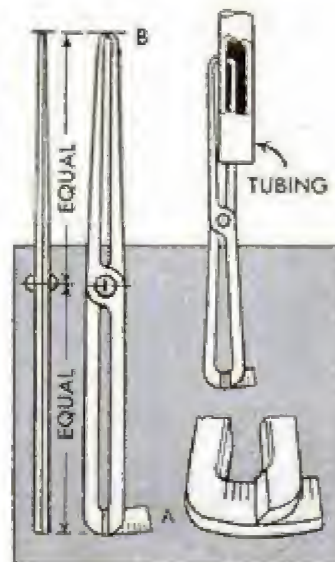
## Car Axle Provides Gate Hinges

The front axle from an old car will make a strong and serviceable pair of hinges for a heavy farm gate. Cut the axle in half and drill three holes in each of the halves to bolt them firmly to the gate uprights. Either large washers or a piece of flat iron drilled with registering holes should be placed on the opposite side of the uprights to serve as a bearing plate for the nuts. Then, bore holes through the post to take the wheel spindles and fasten them in place rigidly with wheel nuts and washers.



## Outside Caliper Has Scale

With this outside caliper, the thickness of the walls of pipe and tubing may be measured several inches from the end, and the measurement noted while the caliper is still in position. A scale which gives a direct reading from the measuring points is mounted at the opposite end of the caliper. Distances from the pivot point to scale A, and the measuring points, B, must be exactly equal, as the slightest variation will give an inaccurate reading on the scale. The scale should read zero when the measuring points are in the closed position.

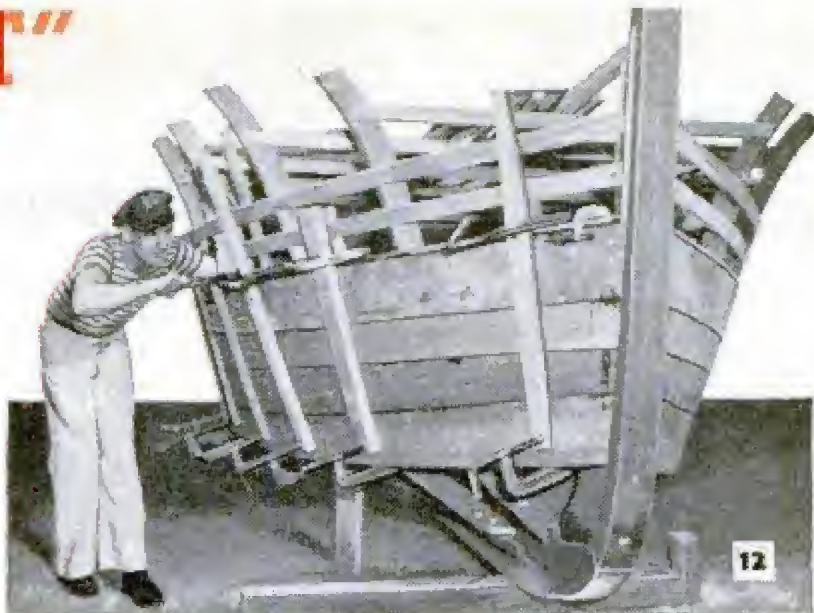




# "SEA CRAFT"

## α 25-ft. Cabin Cruiser

### Part II



WHEN the keel, apron and bow-stem parts have been bolted together as described in Part I, a suitable erection site must be selected. As a boat of this size, in most cases, requires being built outdoors on uneven ground, blocking is necessary to support the bottom of the keel at the correct angle in relation to the base line. A leveled chalk line stretched between two stakes to correspond to the base line of the profile drawing, will serve as a starting point from which to measure heights of the blocks. The exact heights can be determined by taking measurements from the base line to the bottom of the keel on the full-size profile drawing. Two wedges driven between the keel and a block, Fig. 19, give close adjustment. The bow stem also must be lined up perpendicular athwartships. This can be done with a plumb line fastened to the top of the bow stem, as in Fig. 28.

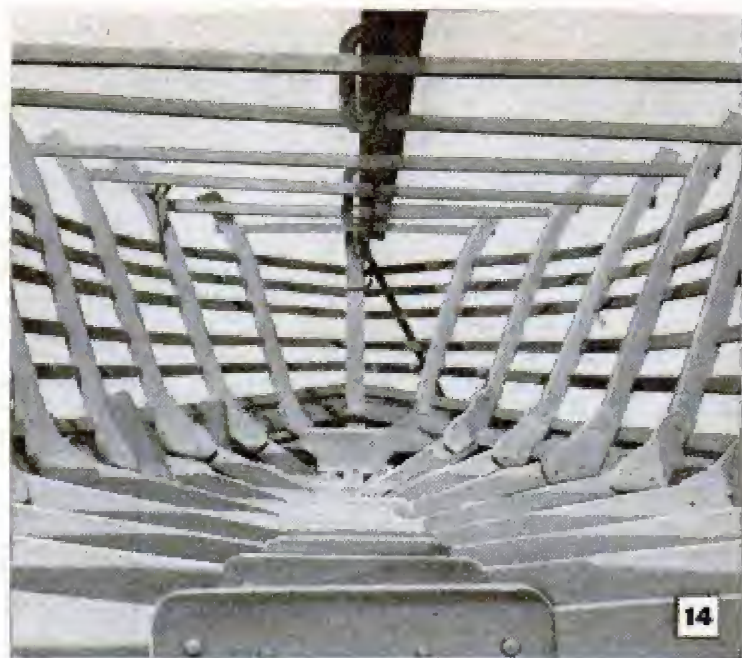
By Edward Colby

The transom is made as shown in Figs. 15 and 16. The aft edges of the top and bottom timbers have a convex curve of 12-ft. radius as in the plan view of Part I. The top timber is crowned 2 in. and the bottom timber is notched for the apron, and tapered  $\frac{1}{8}$  in. from keel to chine on the lower surface. When assembled, the transom is bolted to the keel with a knee block, as indicated in the lower left-hand detail of Fig. 16, and then braced to hold it in position. It must be perpendicular to the base line and exactly centered on the keel.

Before assembling the rib frames on the keel, refer to the profile view, Fig. 4, of Part I. Note that the No. 6 frame straddles the station line and that frames 1 to 5 inclusive are forward of the station lines, whereas frames 7 to 12 inclusive are aft of the station lines. This refers only to the thickness of the rib and does not apply to





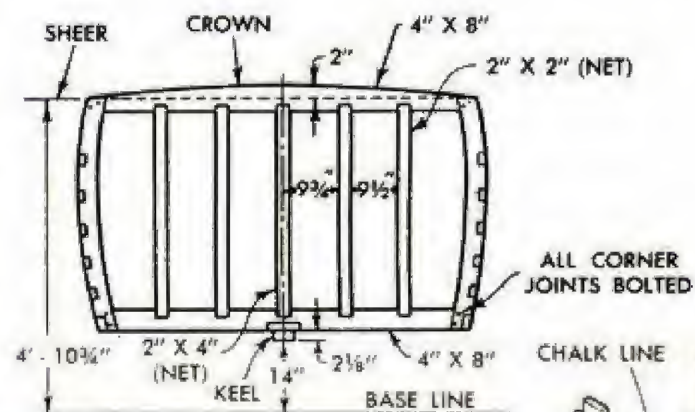


the thickness of the tie bar. To start assembling, first mark each station line on the apron. Then draw a second line representing the thickness of the rib and set up the frames between the two lines. Use galvanized lag bolts to fasten the frames to the apron, Fig. 17. A chalk line from the center of the keel to the center of the transom, Fig. 16, is used to line up the frames with the centerlines marked on the temporary tie bars on each frame. The frames also must be at right angles to the keel athwartships and should be well braced.

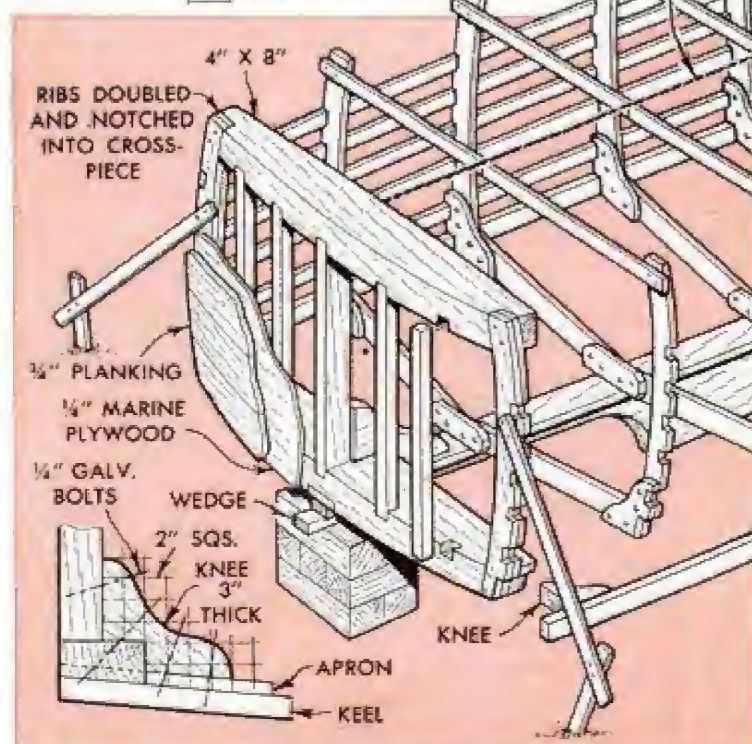
The chine, which is vertical-grained oak, is fitted to the frames in one piece from bow to stern. To determine the position on the bow stem where the chine notch should be cut, clamp the chine in the rib notches and bend it over to the bow stem. The chine notch on the other side of the bow stem should be exactly opposite this point. Before fastening them permanently, be sure none of the station frames has been sprung out of position. A board clamped across the tie bars as in Figs. 13 and 14, will help keep the frames aligned.

Screw the chines to the bow stem and transom with  $1\frac{1}{2}$ -in. No. 9 galvanized screws and bolt them to each rib gusset as in Fig. 17. Sea Craft is planked with  $\frac{3}{4}$ -in. Philippine mahogany, but other woods such as white cedar or vertical-grained Douglas fir may be used. Be sure that all lumber is boat stock and keep in mind that it must be wider than the final width of the planks. In some cases, a 10-in. piece will make only a 6-in. plank. There is no set width for the finished planking. However, planking of uniform widths will give the best appearance. The battens are  $\frac{3}{4}$  by 2-in. and of the same material as the planking. They are notched into the ribs and may be spliced over a rib. When laying out

A plank, extending full length of boat and clamped to temporary tie bars, as shown in upper left photo, will help keep frames in proper alignment when installing the battens and planks. Photo above shows interior of the assembled frames looking forward



15 TRANSOM

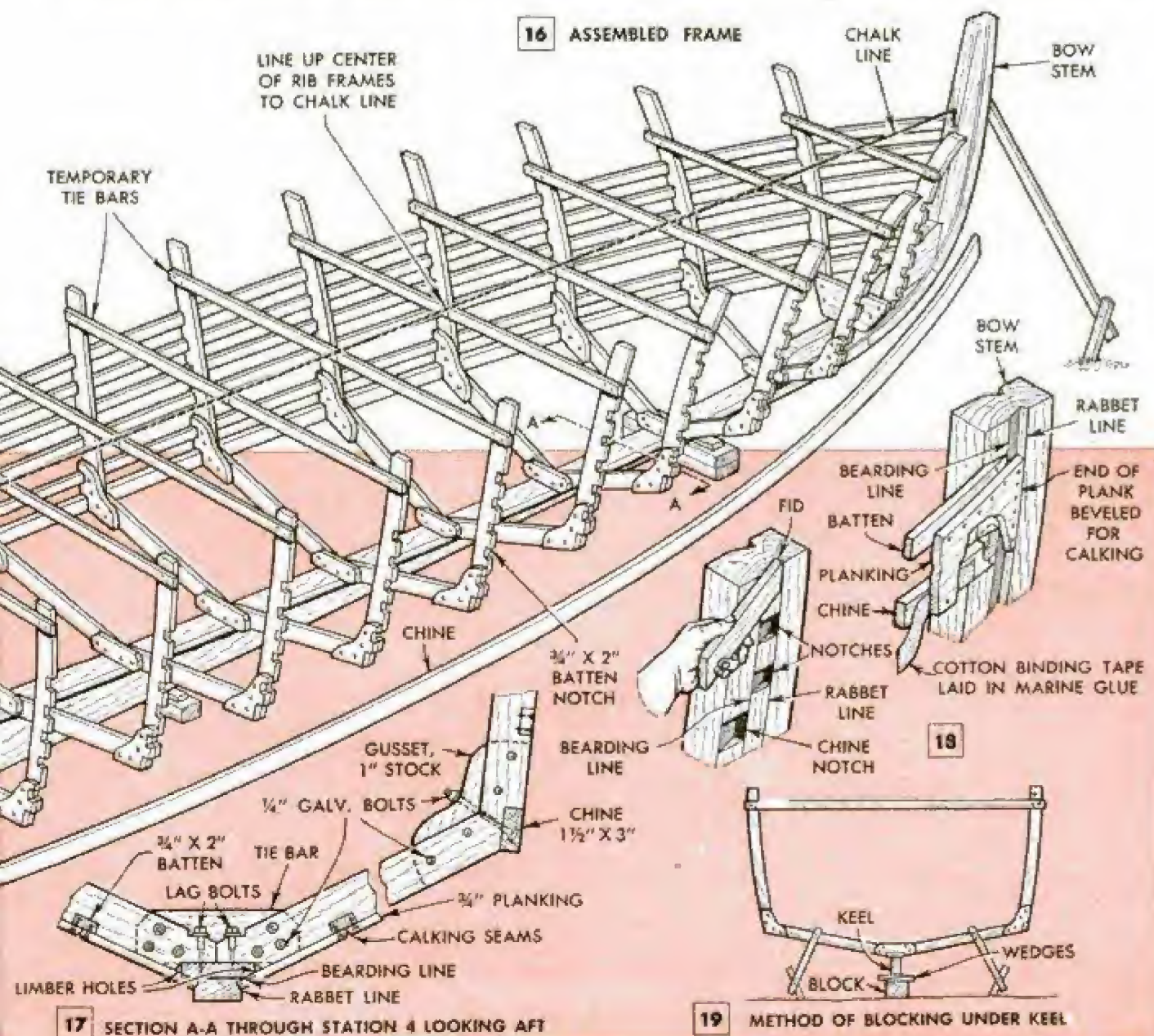




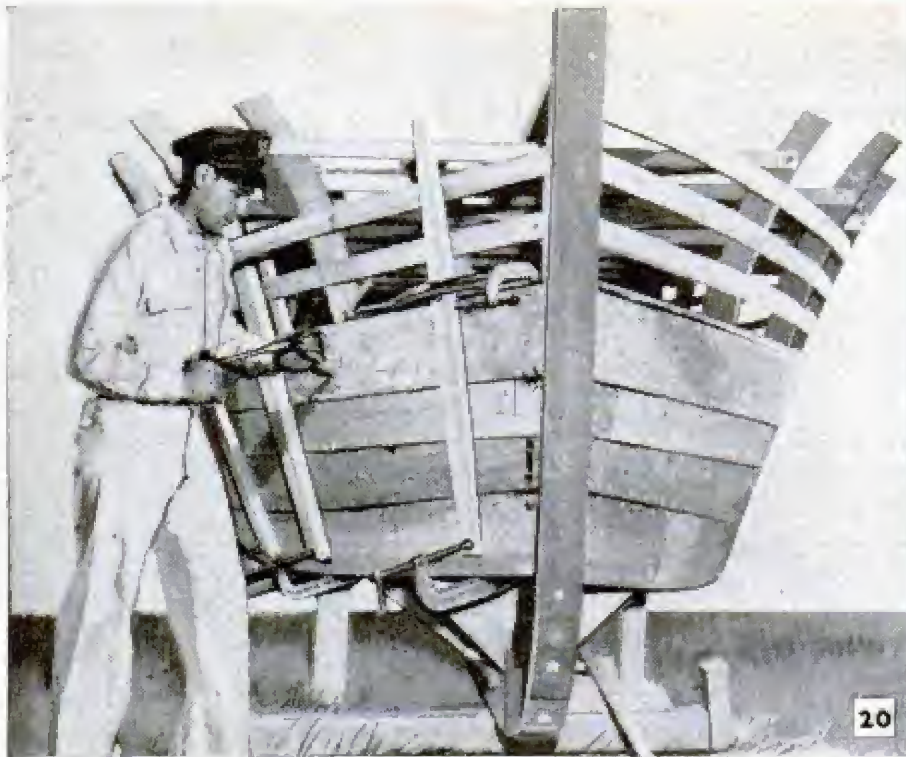
the batten notches, measure upward from the bottom of the chine so that the center-to-center distance between the battens will equal the width of the planks. In this way, the seams between the planks will be directly over the centers of the battens as in Fig. 21. The battens are notched into the bow stem the same as the chines so the planking will fit snugly into a rabbet cut in the bow stem, Fig. 18. Notches are cut at intervals between the rabbet and bearding lines and checked for correct depth and angle with a fid, which is a small block the same thickness as the planking, Fig. 18. Then the waste is removed between these notches to form a continuous rabbet. When installing the battens alternate them from port to starboard side to equalize the strain on the frames.

As the side planks lap over the transom planking, the transom must be planked first. Cover the transom frame with  $\frac{1}{4}$ -in. marine plywood and fasten with flat-headed screws, countersunk. Then screw  $\frac{3}{4}$ -in.

mahogany planking over the plywood, counterboring the screw holes to take wooden plugs as in Fig. 21. For a neat appearance, run the grain of the plugs the same way as the grain of the planking. When planking the sides, start at the chine and alternate from side to side, being sure that the plank ends fit correctly into the bow-stem rabbet. Clamp the plank in place at the bow stem and mark for cutting. Then remove, cut and reclamp for further fitting. Repeat until you have a good joint. It will be necessary to steam the forward ends of all planks to prevent breakage. To avoid marring the wood when clamping the planks, use a strip of wood between the clamp and plank as in Figs. 12 and 20. Work from the bow toward the stern, keeping the bottom edge of the plank even with the bottom edge of the chine. When in place, mark the inside surface of the plank along the top edge of the first batten. Then remove the plank and draw another line 1 in. in toward the



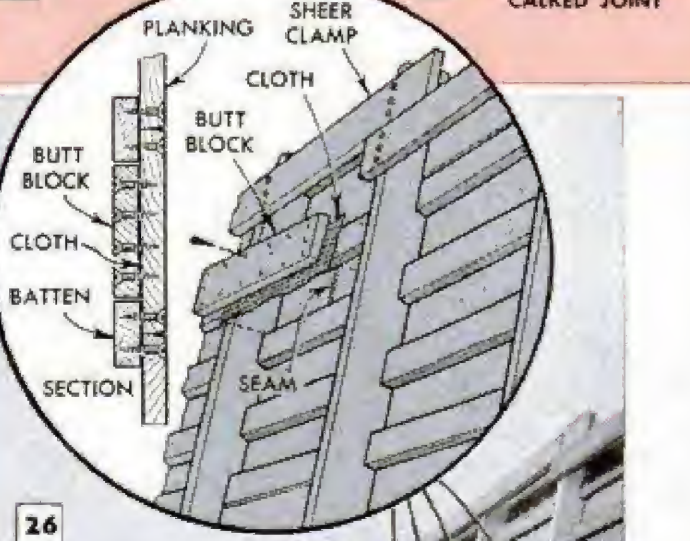
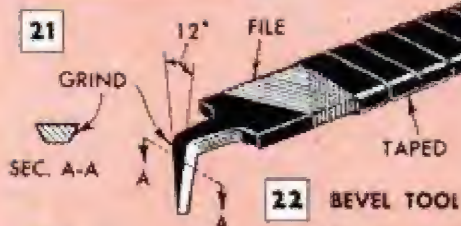
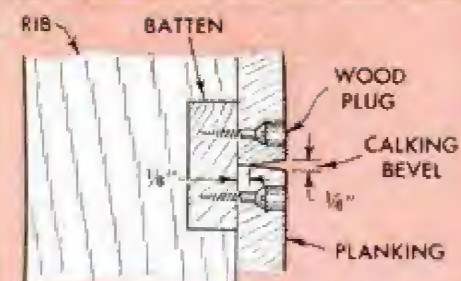




chine edge. This is the cutting line which will bring the edge of the plank over the center of the batten. A slight bevel for calking, as in Fig. 21, should be planed along the edge. Before attaching the plank permanently, coat the chine and lower half of the first batten with marine glue. Apply muslin or cotton binding tape and more glue. Then clamp the plank firmly in place and fasten with  $1\frac{1}{4}$ -in. No. 8 flat-headed galvanized screws at the battens and  $1\frac{1}{2}$ -in. screws at the bow stem. Stagger all screws so they do not run in the same grain and place about 1 in. apart at the bow stem and 3 in. apart along the battens and ribs. Counterbore all screw holes for wooden plugs to be added later.

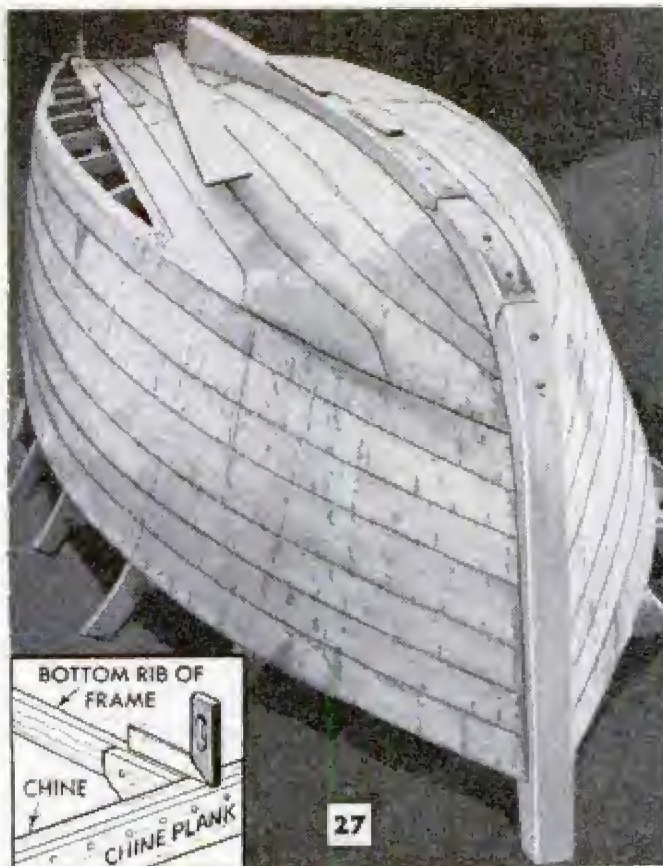
Planks can be spliced between the ribs amidships where the bend is not severe. A butt block, shown in the inset of Fig. 26, is used to join the ends of the planks. Use muslin and plenty of glue between the block and planks. Splices in adjacent planks should be staggered as in Fig. 26. Binding tape is not needed in seams above the L. W. L. Fig. 25 shows how the edges of the planks are drawn tightly together with wedge blocks.

Turn the boat over after all the side planks, except the sheer plank, are in place. This is left off to prevent it from being damaged. The bow-stem rabbet must be continued along the entire length of the keel, and the apron must be beveled flush with the bottom edge of the ribs. At this time, be sure the notches that serve as limber holes have been cut in the ribs on each side of the apron, Fig. 17. Also be sure the stopwaters are in place. These are  $\frac{1}{2}$ -in. softwood dowels dipped in paint and



Planks are butted together between ribs and joined with a butt block. Adjacent splices are staggered





driven into holes drilled through the keel athwartships between the rabbet and bearding lines at four places as in Figs. 4 and 9 of Part I.

The bottom edge of the chine and chine plank must be planed flush with the bottoms of the ribs. Test with a small square as detailed in Fig. 27. The bottom planks, especially forward, require considerable fitting and cutting to bring them to exact shape. A cardboard template for the forward end of each plank will simplify this fitting job. Fig. 27 shows the unusual contours the bottom planks assume at the forward end. It is best to install the bottom battens as the planking proceeds. Binding tape laid in marine glue is used on all bottom planks. Install the planks adjacent to the keel first, and then work toward the chine.

When this much of the planking is completed, wooden plugs dipped in marine glue are driven into the counterbored screw holes and cut off flush with the surface. The plugs can be purchased and should be of the same material as the planking. The bottom of the keel is planed flat to approximately the position of the second station. From this point forward the keel takes a slight bevel, which tapers to a sharp bevel at the bow stem, Fig. 28. Sand, calk and paint the bottom before turning the hull upright. Although a power belt sander is preferred, a disk sander may be used if care is taken not to gouge the planking. To clean out the plank joints for calking, bend and grind the tang of a



file as shown in Fig. 22. Cotton marine calking is driven into the seams with the calking tool shown in Fig. 23. Use plenty of calking along the keel seams. However, one strip between planks is usually enough because room must be left for the calking putty, which is applied with a knife over the calking cotton. The putty is slightly indented below the surface as in Fig. 24. To prevent the bottom from drying out, give it a coat of copper bottom paint. The hull is quite heavy now so probably you will need more help to turn it over. As the boat will remain in this position until it is finished, level the L. W. L. and securely block the hull in position.

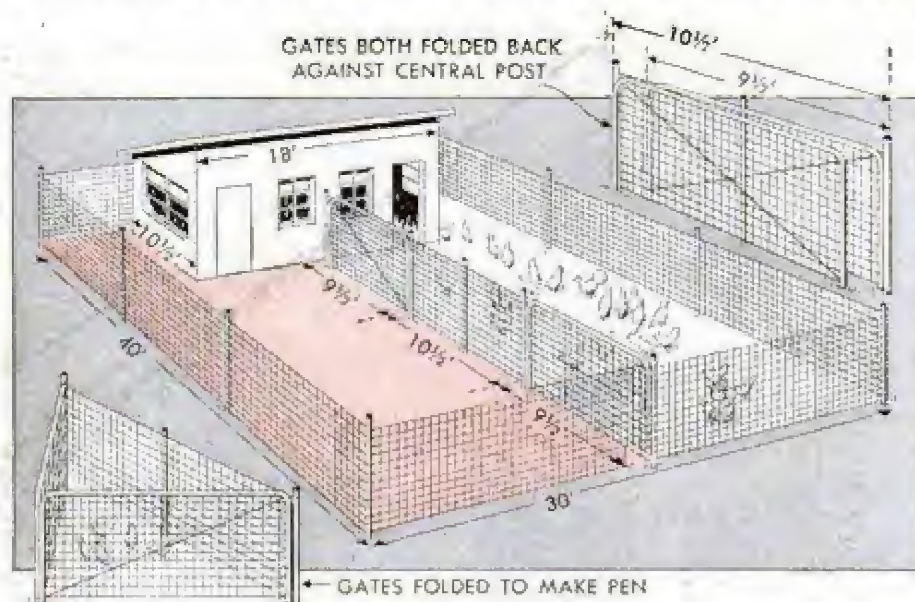
Next, install the top or sheer planks. Carefully fit the bottom edge of the planks and clamp in position on the hull. Transfer the sheer-line marks on the ribs to the sheer planks and cut them slightly oversize at the sheer lines to allow for planing later. When the sheer planking is in place, plug the screw holes and calk the seams. Then sand the transom smooth, fill with a mahogany-colored wood filler and follow with two coats of marine varnish. The inside of the hull is painted with a mixture of white lead and linseed oil.

The best way to bevel the edge of the bow stem is with a wide wood chisel as shown in Fig. 28. Although there is enough stock to bring the stem to a sharp edge, most boatbuilders prefer a flat edge about  $\frac{3}{4}$  in. wide which is faced with a half-round metal strip.

(To be continued)



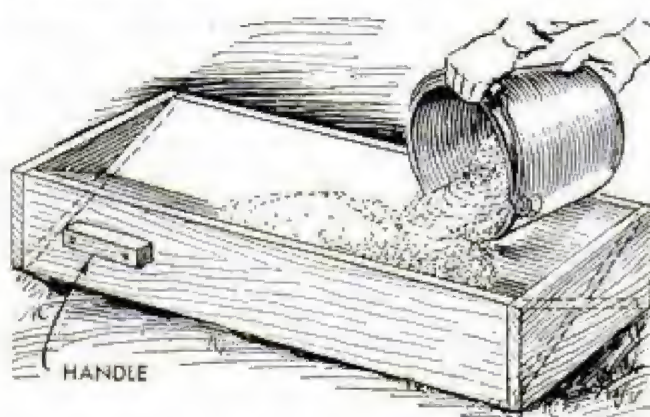
# Fence Divides Poultry Pen to Supply Green Food



Keeping a flock penned alternately on one side of a divided yard while feed is growing in the other, assures the chickens fresh "greens" all through the summer months. Note that the gates of the fence also fold to form a small culling pen. By using dimensions proportionate to those given in the drawing for the gate section, a similar fence may be built in a yard of almost any size.—D. Jay Rhoades, Omaha, Nebr.

## Reversible Feeding Trough Keeps One Side Free of Ice and Snow

You can solve the annoying problem of ice and snow accumulating in the feed trough during the winter time, by building this reversible one that merely is turned over when the top side is not usable. Unless the weather is extremely cold, the ice usually will melt from the underside leaving it ready for use at the next feeding. Build the trough with a double-V bottom as shown, using one board wide enough to extend from corner to corner diagonally and two narrower boards nailed in place to form a V-shape on each side.

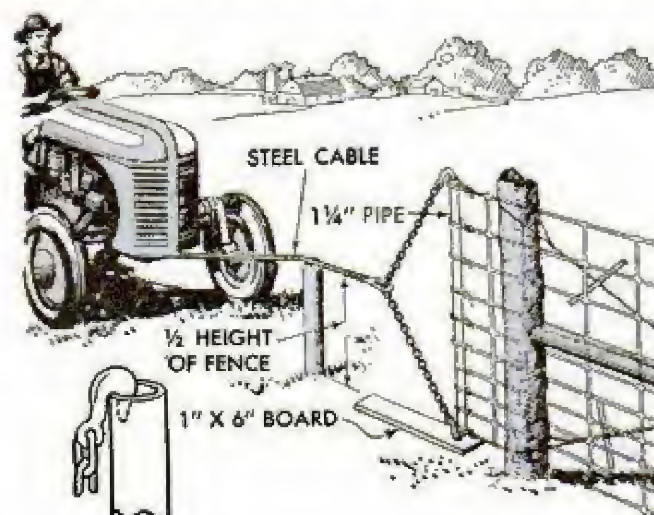


## Pipe-and-Chain Rigging Employs Tractor to Stretch Wire Fencing

Having to erect a woven-wire fence recently without help, I was able to do the job quickly and easily by putting the tractor to work to do the stretching. This was done by first twisting the ends of the fencing around a length of pipe and resting it on a board. Then I hooked a strong chain into the ends of the pipe and attached a

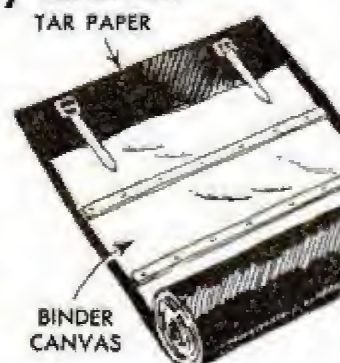
steel tow cable to it in the manner shown. With the tractor facing the fence, I backed it away slowly until the wire was taut, and set the brakes. Then all I had to do was drive the staples. Note that the removable post supporting the tow cable must be about half the height of the fence to produce an even pull at both top and bottom of the fencing.

L. A. Potts, Panama City, Fla.



## Tar Paper Protects Binder Canvas From Damage by Rodents

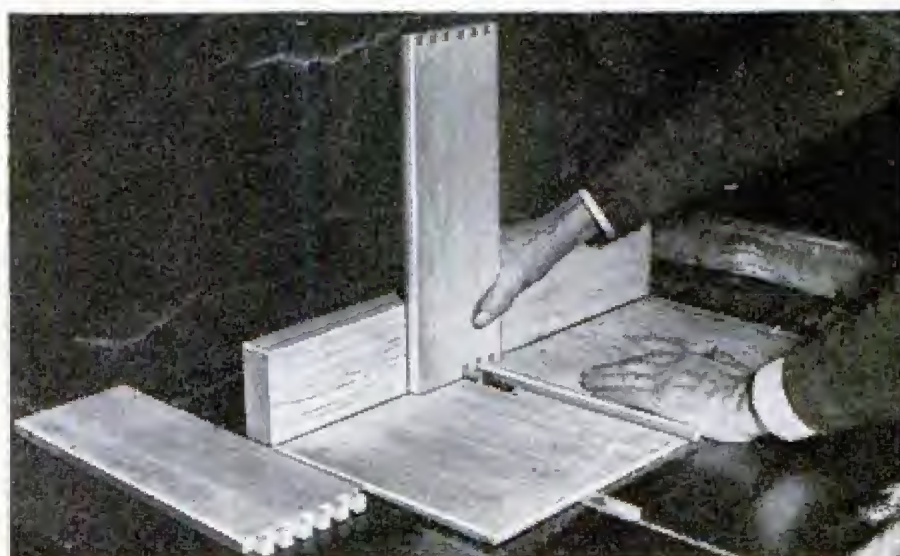
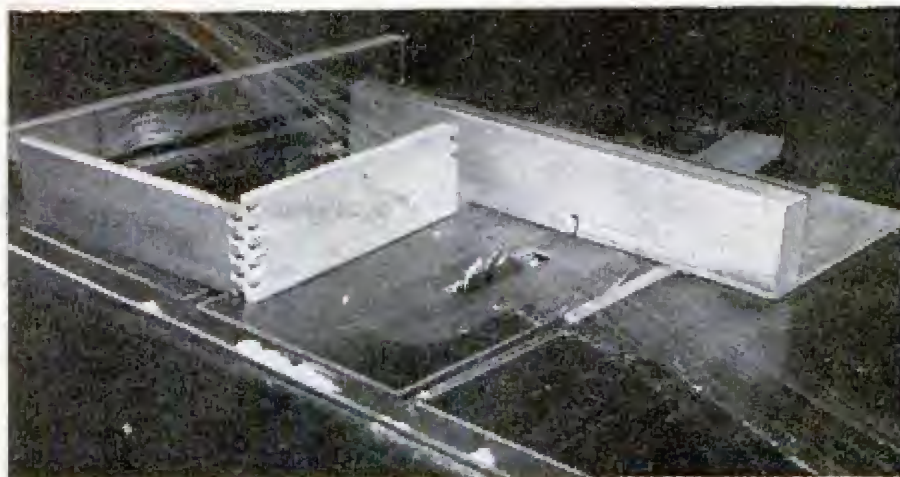
An effective way to keep rats and mice from damaging binder canvas in storage is to wrap it in a strip of tar paper. Use a strip longer and wider than the canvas and roll it as shown.





## Matching Joints Cut With Saw Guide

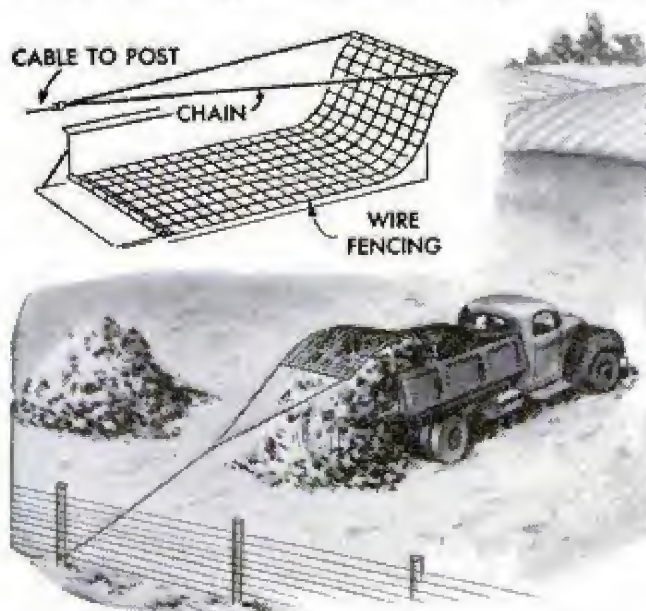
For a shop with limited woodworking facilities, this circular-saw guide or jig will aid in making open-end, mortise-and-tenon corner joints for boxes, chests and similar types of containers requiring matching corners. Although the dimensions of the guide will vary according to the size of box being made and the particular saw being used, the ones given are suitable for most work. The base is a  $\frac{1}{4}$ -in. plywood panel, 12 by 24 in. long and the crosspiece is a 2 by 4-in. board, 24 in. long. The crosspiece is screwed lengthwise to the panel, as indicated by the photographs, and two guide strips that slide in the saw-table grooves are fastened to the underside of the base. These strips should be about 18 in. long. The gauge strip, which fits into the corner formed by the crosspiece and the base, is the only other piece required, and its size and position are determined by the requirements of the job at hand. For example, assuming that you wish to make a box with  $\frac{3}{8}$ -in. mortise-and-tenon corner joints, set the dado head for a  $\frac{3}{8}$ -in. cut and saw through the crosspiece and base for a distance of 5 in.



Trim the gauge strip to a width of  $\frac{3}{8}$  in. and fasten it exactly its own width from the right side of, and parallel with, the cut in the base. Then, to start the cuts on end pieces, hold them against the strip. Side pieces are started  $\frac{3}{8}$  in.—the width of a mortise or notch—to the left of the gauge strip. As each notch is cut, place it over the strip to cut the next one.

Wm. B. Swindells, Baltimore, Md.

## Wire-Fencing "Unloader" Speeds Removal of Material From Flat-Bed Truck



Removing a load by hand from a flat-bed truck is slow and laborious work, but with this wire-fencing and chain arrangement, corn fodder, stovewood and other materials that will not slip through the mesh can be unloaded in short order. For finer materials, use a fine-mesh screen. The detail shows how the fencing is placed on the bed of the truck with one end fastened near the tail gate and the free end reinforced with a spreader made from a length of 2-in. pipe to which chains and a cable are attached. Load the truck in the ordinary manner, putting the load on top of the fencing. To unload, tie the cable to a post and drive the truck forward slowly, being careful not to tear the fencing from the tail gate. Carry a stake to anchor the cable in case a post is not near.



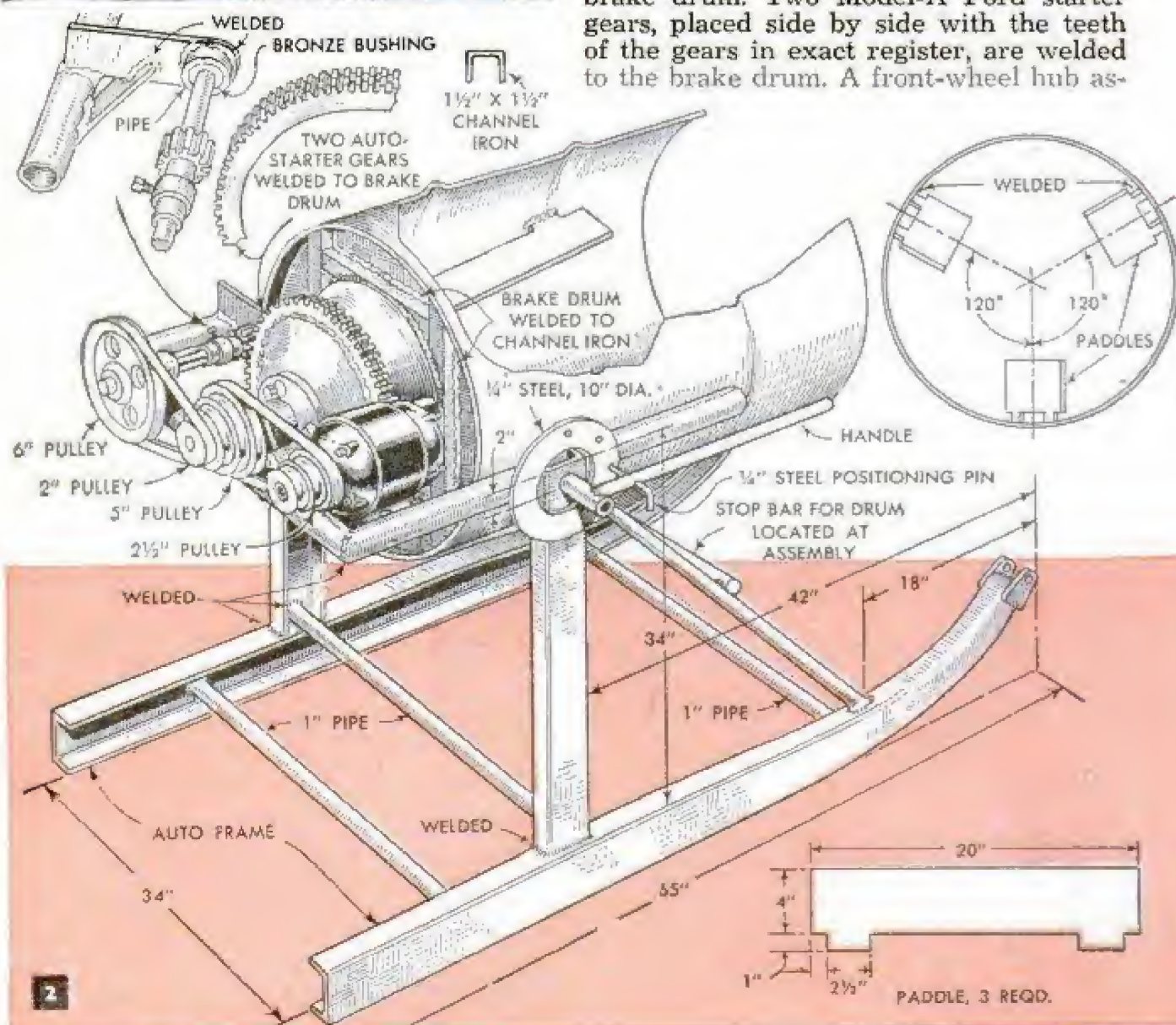
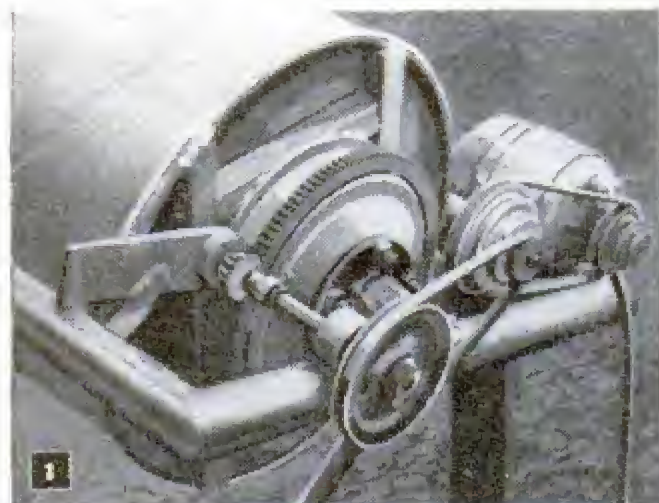
# POWER MIXER for FEED, SEED

Used car parts and a 55-gal. oil drum are the principal units of this motor-driven mixer, which is used for mixing concrete, dry and moist feeds, and for dusting seed grains for fungus diseases

*By Edward R. Lucas*

**B**UILT with metal runners cut from an old car frame, this electrically driven, self-contained mixer is easily moved to the work. It will handle almost any dry or moist material, such as finely ground feeds, cement aggregate and small grains which are to be dusted for fungus diseases. A triple-speed reduction through a two-stage V-belt drive, plus a pinion and gear, means that the machine requires only a  $\frac{1}{4}$ -hp. electric motor to handle the heaviest loads.

Fig. 1 pictures this multiple drive while Fig. 2 details the complete construction. A section of an old car frame and a number of chassis parts (rods, braces and the like) are welded together to make the frame for the machine. Next, pieces of channel iron are welded to the bottom of the oil drum to make a square base for a brake drum. Two Model-A Ford starter gears, placed side by side with the teeth of the gears in exact register, are welded to the brake drum. A front-wheel hub as-





# or CONCRETE

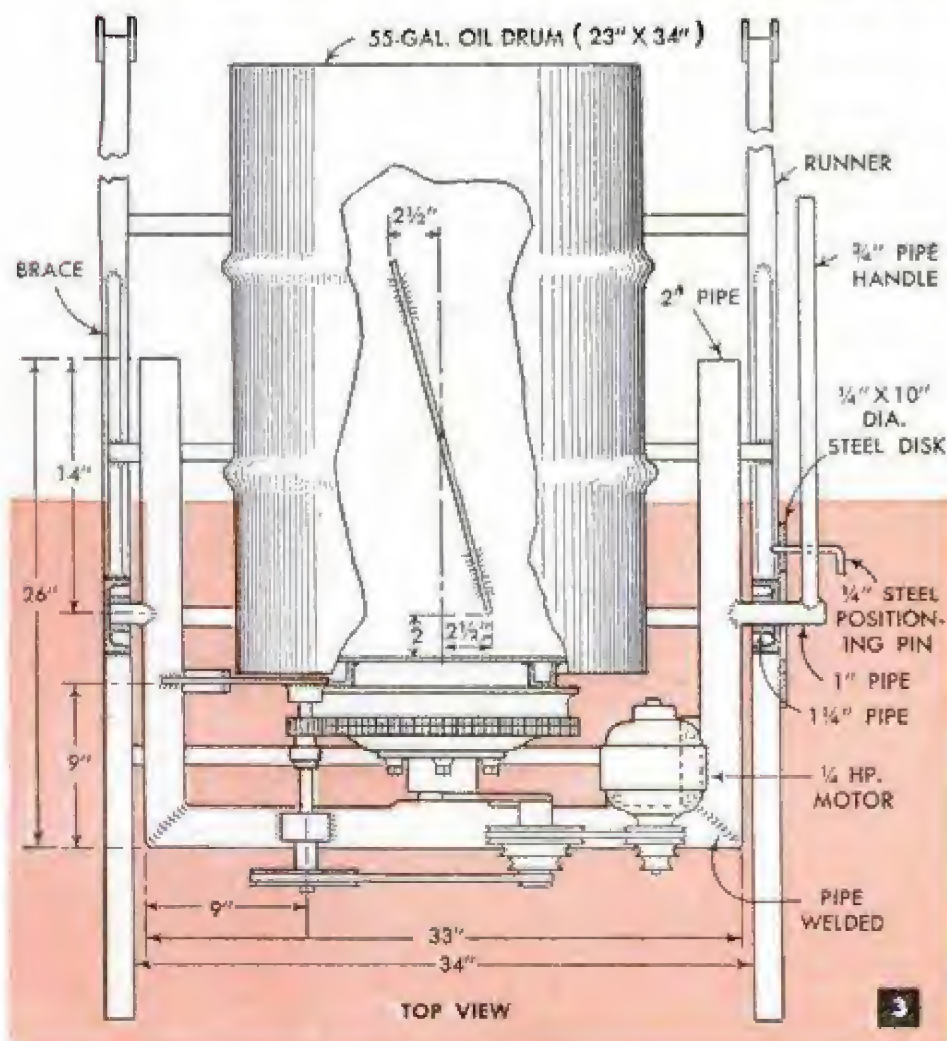
sembly is bolted to the brake drum, which then is tack-welded to the channel-iron base.

To make the U-shaped frame which supports the oil drum, cut three lengths of 2-in. pipe, mitering the ends and welding together as shown in Figs. 2 and 3. Next, short lengths of pipe are welded to opposite sides of the U-frame to serve as axles on which the oil drum pivots. Note that when the machine is assembled, as in Fig. 3, one axle extends through the channel-iron frame member so that a  $\frac{3}{4}$ -in.-pipe handle can be welded to it. A pin passing through a hole drilled in the handle enters holes drilled in a steel disk and holds the mixing drum in several positions from horizontal to vertical. Weld the end of the wheel spindle to the base member of the U-frame, so that the oil drum is centered in the frame. This arrangement allows the oil drum to turn freely on the roller-bearing wheel hub independent of other support.



Three paddles are welded inside the drum 120 deg. apart. These are of  $\frac{1}{4}$ -in. sheet steel cut to the dimensions given in the lower right-hand detail, Fig. 2, and are placed at the approximate angle indicated in Fig. 3. The upper left-hand detail in Fig. 2 shows the assembly of the pinion shaft.

The pinion drive gear is fixed to the shaft by welding it to the end of a pipe nipple which in turn is locked on the shaft with a setscrew. The outer bushing or ball bearing is also in a housing which is welded to the U-frame, and a collar against this bearing holds the shaft in place. The  $\frac{1}{4}$ -hp. motor is bolted to an L-shaped base welded in one corner of the U-frame, as indicated by dotted lines in Fig. 3. A short length of pipe into which two bronze bushings are forced, provides a bearing for the jackshaft. The pipe is welded to a flat-iron arm, which is welded to the U-frame. Step V-pulleys on the motor and jackshaft permit a range of speeds. Finally, a stop bar for the oil drum is welded to the angle braces of the supporting frame. The bar should stop the drum at a point just slightly below the horizontal position.





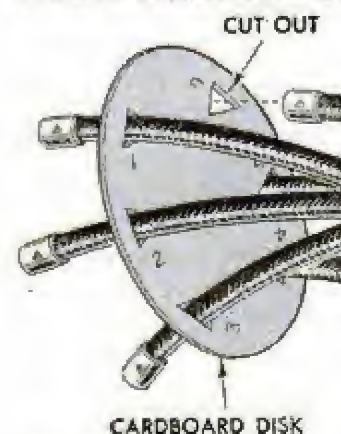
## Offset Centering Attachment Permits Taper Turning



If the tailstock of your wood-turning lathe cannot be shifted laterally to permit taper turning, this auxiliary attachment provides an adjustable tail center. It fits in place of the regular tailstock center and has a movable center which can be offset to suit the taper desired. To make it, cut off the cup end of an extra Morse-taper center and weld it to a short length of threaded rod or a section of bolt. Next, weld the tapered part of the severed center to a U-shaped rod as shown in the detail. Then cut a slot in a piece of flat iron for the movable center and weld it to the U-shaped rod. Finally, weld two flat-iron legs to the assembly to rest on the lathe bed and support the centering attachment laterally in a horizontal position.

James McDonald, Johnsonburg, Pa.

## Paper Disk Tags Ignition Wires When Removed From Distributor



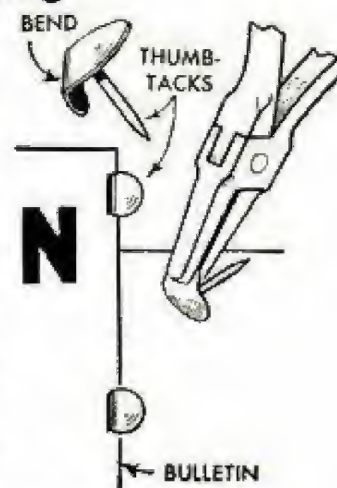
Unless ignition wires are numbered, it is very important when removing them from the distributor that they be tagged. Otherwise, you stand a good chance of fouling the firing order of the engine by forgetting where

each wire goes when replacing it. To avoid this, one mechanic used a cardboard disk to tag the wires. Holes were made in it and numbered as shown, and as each wire was removed from the distributor, it was inserted in the corresponding hole in the disk. Held in this manner, there was no way of getting the wires mixed up.

Gene Holce, Seattle, Wash.

## Thumbtacks Fasten Bulletins Without Perforating

By bending one side of the heads of thumbtacks with a pair of pliers as shown, they may be used to hold papers securely to bulletin boards without perforating them. Used in this way, the tacks need only be pried up slightly to remove the bulletins.



## Metal Guard Protects Trouser Leg While Stringing Barbed Wire

A rectangular piece of galvanized iron bent to the curvature of your hip and thigh and extending from the waist to below the knee makes a good guard when stringing barbed wire. Holes are drilled in the top corners of the metal so that a cord can be passed through them and around the waist to hold the guard in place. Small stove bolts are spaced along the length of the guard to hold the wire at different heights. Holes may be drilled at the end of the guard to tie it to your leg.



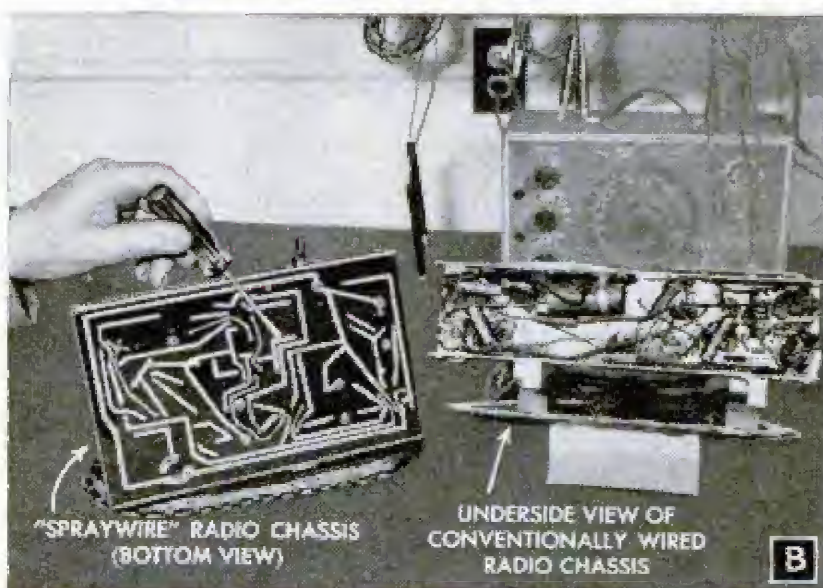




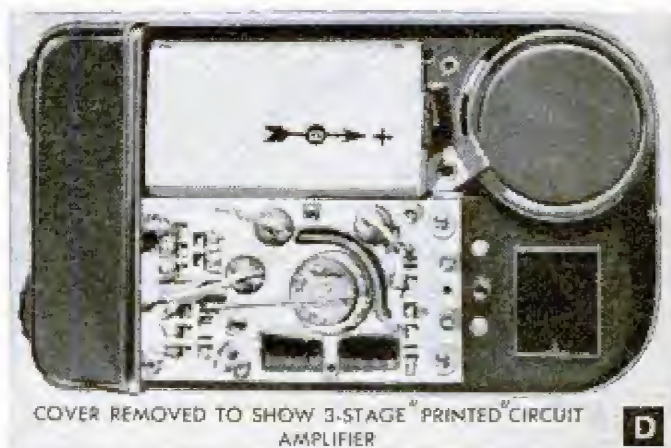
## SPRAYED AND PRINTED CIRCUITS

**R**EALLY "wireless" radio receivers and hearing aids have been made possible by the technique first developed by the Bureau of Standards to solve a space problem in the successful proximity fuse of World War II. This process, which employs paths of silver, or silver oxides, to replace conventional bulky wiring, has undergone many refinements which are now employed in commercial applications. These methods reduce the assembly time and eliminate possible errors in wiring.

The spraying method illustrated in photos A and B is employed by Spraywire Laboratories Inc., Minneapolis, Minn. A circuit stencil is applied to a dielectric material such as a plastic, or ceramic, panel which is to provide the chassis of the receiver; a sandblasting process is then used to form grooves in the panel which are later filled with metal. Tube sockets, condensers, etc., are mounted on top of the panel prior to the blasting and metallizing, and their contacts are sprayed into permanent connection with the conductors. The tiny hearing aid shown in photos C and D, designed by Allen-Howe Electronics Corp., Peabody, Mass., employs a "printed" circuit, 3-stage high-gain audio amplifier on a ceramic plate smaller than a calling card. Sub-miniature tubes fit into clips on the opposite side of the panel. A long-life A-battery and a 22½-volt B-battery are all contained in the case.



"SOLO-PAK"  
HEARING AID



COVER REMOVED TO SHOW 3-STAGE "PRINTED" CIRCUIT  
AMPLIFIER



# TAPPED-COIL CRYSTAL RECEIVER AND



SINCE a crystal set is the simplest form of radio receiver, it is the logical starting point for the student or junior experimenter. Unlike other types of receivers a crystal set uses no batteries or power-line supply, therefore the sound that emerges from the headphones is derived entirely from radio energy picked up by the antenna. It is apparent then that a good antenna and ground are particularly necessary for satisfactory crystal-set performance. Time is always well spent in putting up a long, high, antenna and in making a good low-resistance ground connection to a cold-water pipe. The crystal set must also be efficient so that the small amount of signal power collected by the antenna will not be wasted and the set must be as selective as possible in order to separate stations.

The tapped-coil crystal receiver illustrated in photos A and B employs adjustable loading in a simple tuning arrangement that is very effective when used with a good sensitive pair of headphones. A schematic circuit diagram and the coil-winding details appear in Fig. 1; pictorial wiring diagram in Fig. 2 shows all connections clearly.

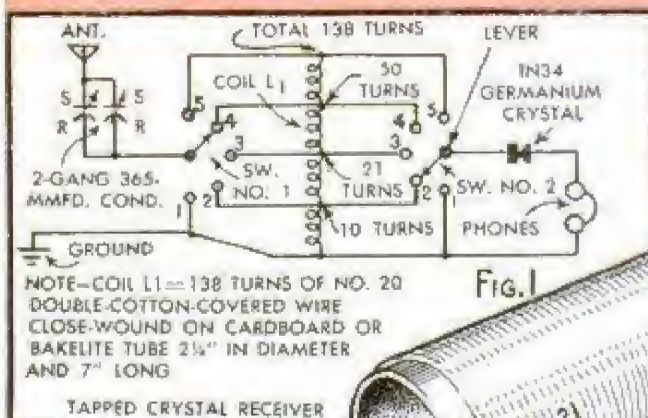
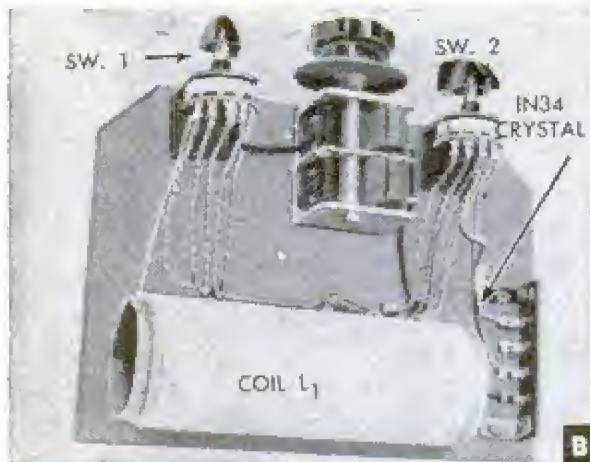


FIG. 1

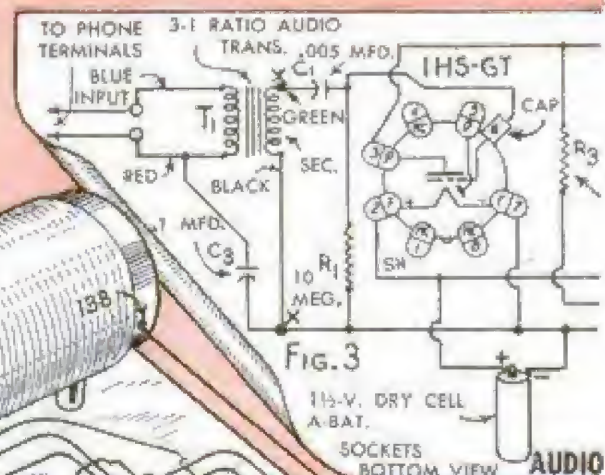


FIG. 3

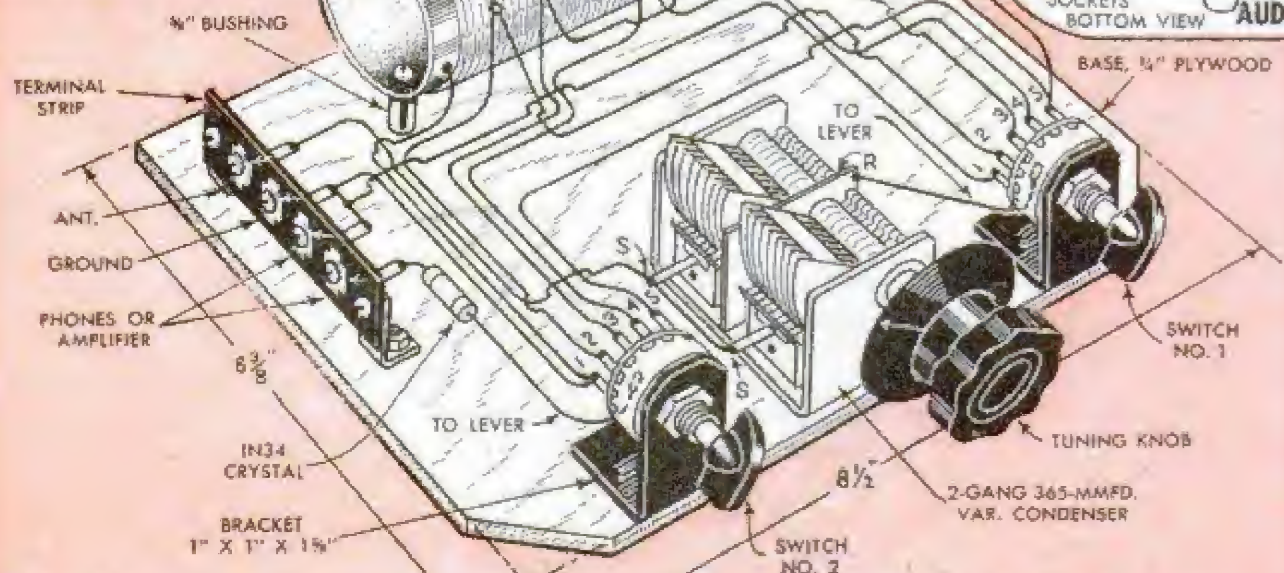


Fig. 2

CRYSTAL RECEIVER



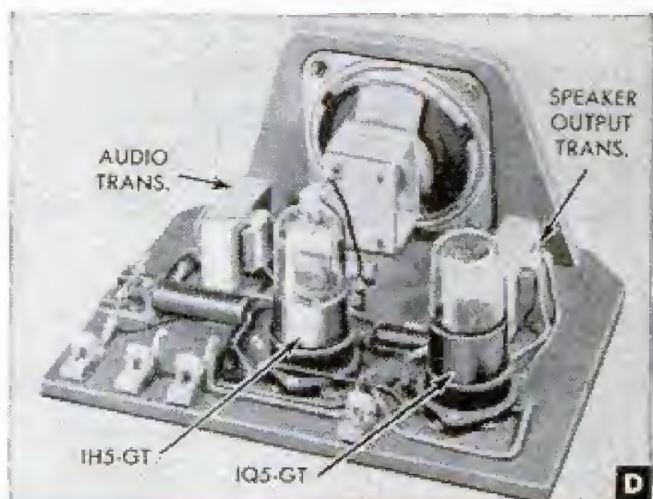
# BATTERY-OPERATED AMPLIFIER

The 2-gang variable-condenser stator plates (S), are connected in parallel; the rotor plates (R) are common with the frame. Therefore, the single connection to the condenser frame is all that is necessary. This lead goes to the lever of switch No. 1; the lever of switch No. 2 is connected to one side of the 1N34 germanium crystal. These switches are single-pole, five-position Mallory No. 3115J type, and are mounted on standard angle brackets. Coil L1 is mounted on small bushings; Fahnestock clips may be substituted for the 4-screw terminal strip if desired. When winding the coil, place a toothpick or matchstick under the turns which are to be tapped; this aids in the removal of the insulation where the leads are to be soldered

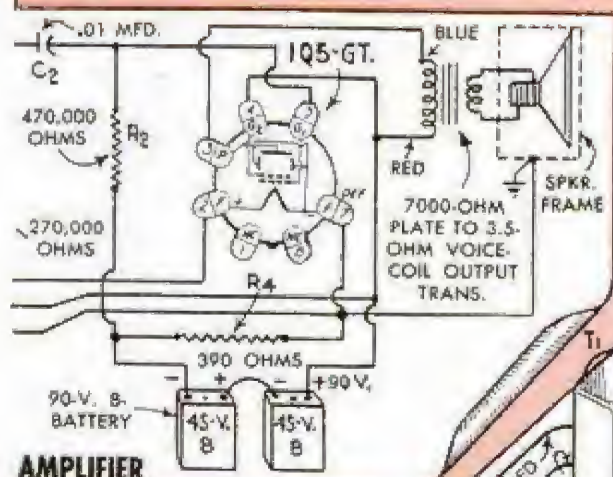
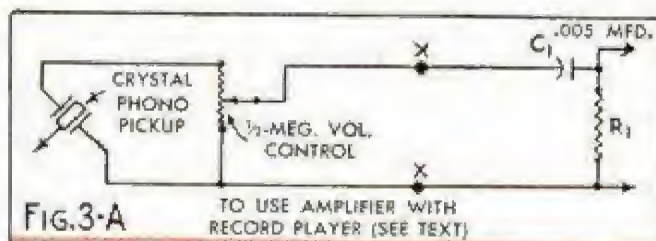
(Continued to page 236)



C



D



RESISTORS  
 R1=10 MEGOHMS  
 R2=470,000 OHMS  
 R3=270,000 OHMS  
 R4=390 OHMS  
 NOTE—ALL RESISTORS = 1/2-WATT CARBON

FIXED CONDENSERS MAY BE  
 200, 400 OR 600-V. PAPER TYPE

FIG. 4

AUDIO AMPLIFIER

PANEL AND BASE  
 1/4" PLYWOOD

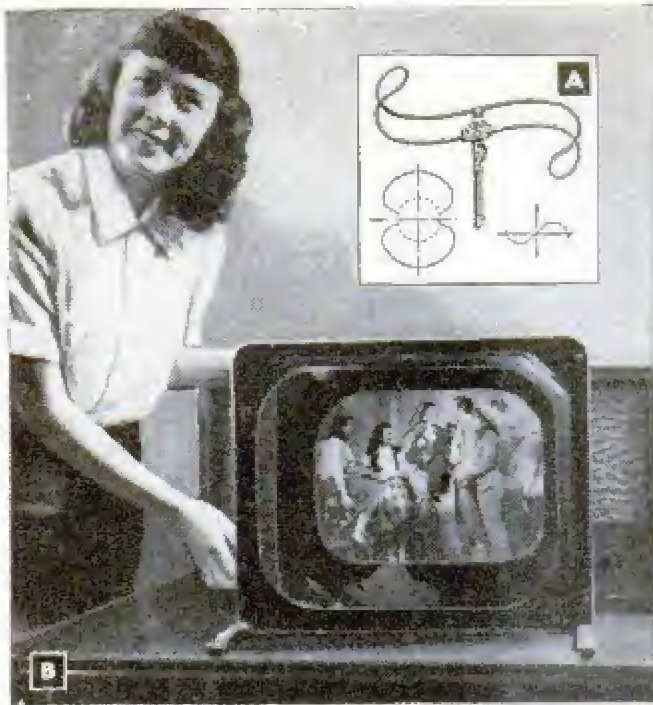
3" PM SPEAKER

VOICE COIL LEADS

NOTE—  
 TERMINAL NO. 6  
 IS USED AS A TIE-  
 POINT ON 1Q5-GT  
 TUBE SOCKET  
 N. C. = NO CONNECTION



# RADIO-ELECTRONICS TODAY



(A) Nondirectional "S" dipole antenna for television and FM receives stations at various points in any locality. Field pattern indicates intercepted signal strength around the compass.

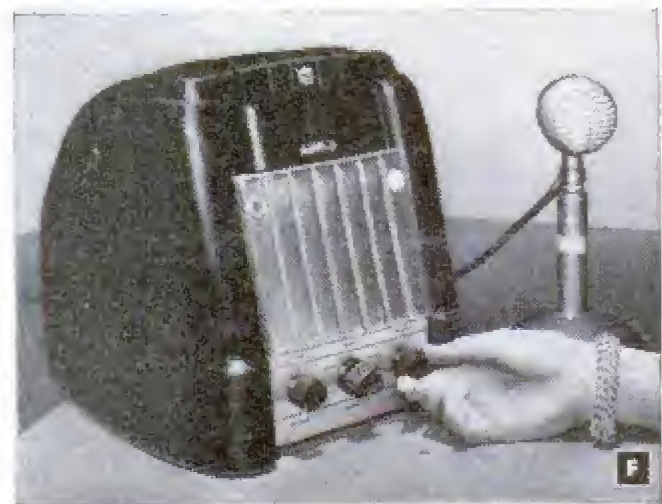
(B) Television-picture magnifier enlarges 7 or 10-in. received images to approximately the size produced by a 15-in. picture tube. Magnifier is a hollow plastic lens filled with a clear oil.

(C) Five-deck chassis construction and a 12-in. direct-view swivel screen, which can be focused in any direction, are features of this TV receiver.

(D) Portable camera-radio includes a battery-operated superheterodyne receiver, and a camera which employs a standard roll film, thus providing both radio programs and candid camera shots.

(E) Matching television console, radio-phonograph combination and record cabinet are available in units which may be purchased separately and matched at any time. The television section retails for about \$300; it offers a 10-in. screen and employs a 28-tube circuit. FM is included in the radio-phono section.

(F) Lightweight wire recorder eliminates complicated handling of wire by utilizing a simple plug-in cartridge. It is housed in a streamlined black plastic cabinet with a disappearing carrying handle. The instrument weighs less than 25 pounds with cartridge and microphone. It operates from any 110-volt a.c. power source and includes a 3-watt high-gain audio amplifier for playback.





# What's your choice of these *Marlin .22's?*

Marlin Model 39-A—25-shot Lever Action Repeating Rifle. \$50.45\*



Marlin Model 81-DL—25-shot Tubular Magazine Repeating Rifle. \$26.95\*



Marlin Model 80-DL—8-shot Clip Magazine Repeating Rifle. \$22.90\*



*\*Prices slightly higher west of the Rockies*

Be sure to see these three fine Marlin '48 models at your dealer's soon! Each is an outstanding rifle in its class.

● Here you have three great rifles for small game and all around sport. Marlin's 39-A is the only lever action .22 repeater made...a favorite in hunting circles the world over since 1892. As a practical weapon for vermin and small game, the 81-DL is a wise selection. It carries a full day's ammunition, and its light weight is a great asset in the field. The loaded clip of the 80-DL provides extra shots for fast-running game ...and allows use as a single loader for target work. All three are rugged, man-sized Marlins, famous for accuracy and dependability. All shoot .22 short, long and long rifle cartridges—regular or high speed—without adjustment. Whichever you choose, you'll buy years and years of trouble-free sport!

*American Black Walnut Stocks & Forends Standard on All Models*



Often called the "world's best all around .22," Marlin's 39-A is a light rifle of remarkable accuracy and versatility. Only lever action .22 made. Extra fast for snap and exhibition shooting.



A full day's hunting is provided by the large 25-shot capacity of the Marlin 81-DL. Removable bolt assembly; Off and On safety...a fine "learning gun."

## *Marlin .22 Rifles*

*Outstanding for accuracy, dependability, long life*



12 for 25¢ • Single or double edge

THE MARLIN FIREARMS CO., NEW HAVEN, CONN. • Fine Guns Since 1870



# Speed Sweep

THE BRUSH WITH  
THE STEEL BACK



*Sweeps  
cleaner, faster -  
Outlasts ordinary  
brushes 3 to 1!*

Mail Coupon Today

Milwaukee Dustless Brush Co.  
530 N. 22nd St., Milwaukee 3, Wis.

Please send me complete information about  
Speed Sweep brushes.

Name \_\_\_\_\_

Street Address \_\_\_\_\_

City, State \_\_\_\_\_

## Setting the Stage for an "Ad"

(Continued from page 151)

Kling's it's all part of the daily routine.

Another phase of the complex business of the modern studio is counter and window-display design and production. A separate department plans the cardboard units (called "point-of-sales" material in the trade) that you see on store counters and in windows throughout the nation.

These displays are designed to fold flat for shipment and are easy to assemble so that Mr. Jones, the corner druggist, can put them together without special tools and complicated instructions. And, of course, they must have eye appeal and sturdiness, and must sell the product.

Another Kling activity is producing movie shorts. Most of the work here is in the field of industrial movies, promotional films and film slides. A complete recording studio and projection room designed with perfect acoustics are in another corner of the building. Frequently, the movie cameramen go out on location and when they do, the caravan of vehicles looks like something from Hollywood.

Photographing the thousands of items in big mail-order house catalogues is another phase of Kling's work. Every item is photographed in exactly the proper perspective and size to make the page attractive and at the same time to avoid waste of valuable catalogue space.

Items such as linoleum, rugs, draperies or any product in which design must be shown are cut into small sample strips and pasted on a gigantic wallboard "page." The page is made to exact proportions and when photographed the items are shown precisely as they appear in the catalogue.

Kling's has had some unusual orders, such as the time an observation platform of a streamlined train was built for an advertiser, but the most unusual, perhaps, was the picture that required a gigantic transcontinental bus for a prop.

The giant bus, gleaming in shiny metal, was driven into the studio through the large prop-entrance doors in the rear. Lights were set up and models posed so that the completed picture looked like a scene in a busy metropolitan bus depot.

That was the largest single prop ever used in a Kling photo, but, as Blevins says, you can't be sure what complex problem tomorrow will bring.

"One of these days," he said, "I expect a client to ask us to photograph a trans-Atlantic plane here in the studio. Don't ask me how we'll do it, but when the time comes, we'll find a way."



IF YOUR HAM RIG ACTS  
LIKE THIS... IT'S TIME TO  
HUNT 'BUGS' AND...



IF YOUR CAR FEELS LIKE THIS...  
IT'S TIME FOR MARFAK  
CHASSIS LUBRICATION



**THAT CUSHIONY FEELING LASTS LONGER WITH MARFAK!**

When you get a lubrication job, get a *good* one. Ordinary grease peters out after a couple of hundred miles. But *Marfak* Chassis Lubrication lasts 1,000 miles and more. *Marfak* takes road shocks with ease, clings to wear points and bearings. And notice that long-lasting "cushiony" riding ease! That's *proof* that *Marfak* is on the job. Applied by chart, never by chance. Ask your Texaco Dealer, the best friend your car ever had, for *Marfak* Lubrication.



**THE TEXAS COMPANY**  
**TEXACO DEALERS IN ALL 48 STATES**

Tune In: TEXACO STAR THEATER presents the TONY MARTIN show featuring ALAN YOUNG every Wednesday night. See newspaper for time and station.



not just  
one strong  
point but . . .

**STRONGER  
AT ALL POINTS**



STANLEY No. 923  
BIT BRACE

Look at the Stanley 923 Bit Brace in a workman's tool box. It's probably taken years of hard work, rough use . . . and got little care. Yet it's still a fine tool . . . accurate, smooth working. Steel clad hardwood head turns freely on ball bearings and bronze bushings. Chuck assembly locked in place with perforated nut, cotter pin and slotted screw end. Heavy duty, all steel box ratchet. Universal jaw takes round and tapered shanks, all sizes of auger bits and twist drills up to  $\frac{1}{2}$ ". More tool for your money.

**COUPON brings you  
Two books for your shop shelf**

One is FREE! The other, the latest edition of a famous textbook for the home workshop, cloth-bound, fully illustrated, just \$1.00.

THE TOOL BOX OF THE WORLD

**STANLEY**

Reg. U.S. Pat. Off.

**HARDWARE · HAND TOOLS · ELECTRIC TOOLS**

Stanley Tools, 148 Elm St.  
New Britain, Conn.

Please send by return mail:

☐ FREE booklet: "The Joy of Accomplishment."

☐ 188-page book: "How to Work with Tools and Wood." \$1.00 enclosed.

(In Canada: Send order to Stanley Tool Co. of Canada, Ltd., Roxton Pond, Quebec.)

Name

Address

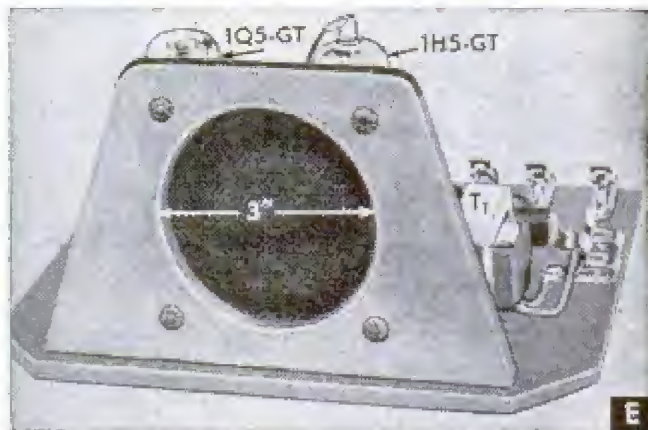
City  State

## Tapped-Coil Crystal Receiver

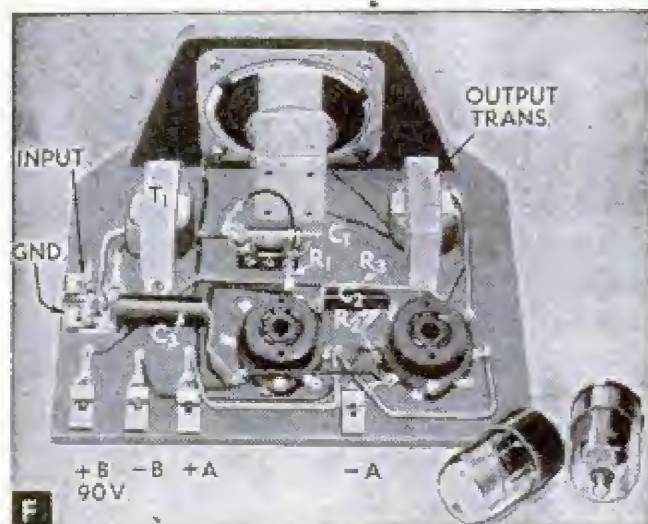
(Continued from page 231)

for switch points at 10, 21 and 50 turns.

Whenever the builder wishes to discard the headphones and use a small loudspeaker with this crystal set, which he will probably want to do at an early date, the 2-tube amplifier shown in photos C, D, E and F, and detailed in Figs. 3, 3-A and Fig. 4 will meet every requirement. Furthermore this highly efficient little battery-operated audio amplifier will make a



handy unit for the experimenter as it is suitable for a number of other uses. It can be employed with any one or two-tube student set and it makes an ideal amplifier for use with any record player. The volume, with this crystal receiver, is ample for the ordinary room and the quality on local broadcasting stations is surprisingly good. Both units are mounted "breadboard" fashion on  $\frac{1}{4}$ -in. plywood, and the speaker baffle is made of the same material. Any d.c. voltage present in the headphone circuit to which this amplifier may



be connected, is isolated from the amplifier circuit by fixed condenser C3. When connecting the units together, the grounded terminal on the crystal set connects to

(Continued to page 240)



*No rust  
for the  
wary!*



*Clean rust out of your radiator with*  
**DU PONT Cooling System CLEANSER**

Drain out your anti-freeze, and clean out winter's accumulation of scum, scale, and rust. Neglect now may mean trouble and costly repairs later. Just pour a can of DU PONT COOLING SYSTEM CLEANSER into your radiator, run the engine 30 minutes or more, and drain. It dissolves rust—cleans thoroughly—improves engine performance. It's safe, sure, and easy to use.



*Keep out rust with*  
**DU PONT Acid and Rust INHIBITOR**

After cleaning out the radiator, you can keep it free from rust all season by pouring in a can of DU PONT ACID AND RUST INHIBITOR. It prevents rust forming, and keeps out acid, too.



*Avoid radiator leaks with*  
**DU PONT Cooling System SEALER**

Stop leaks quickly and securely—and make the cooling system LEAKPROOF—by pouring in DU PONT COOLING SYSTEM SEALER. It will not clog the radiator.



BETTER THINGS FOR BETTER LIVING  
... THROUGH CHEMISTRY



# "Dave ought to know better than that"



**AL:** Yeah, I wouldn't take that set of drills if they gave it to me.

**PHIL:** Just junk—that's all they are. And Dave's bragging about the bargain he got.

**AL:** You'd think he'd know by this time that you can't save money buying "no-name" tools.

**PHIL:** Sure, it's plain as day that when a well-known manufacturer puts his name on tools, those tools have got to be good. And when you buy tools *without* known brand names, you're just throwing money

away.

**AL:** Well, I guess we all have to learn it the hard way.

**PHIL:** Yeah. I made some bad buys before I got wise. Now I stay away from bargain counters and do all my tool buying at the hardware store.

**AL:** Same here—and the first thing I look for is the brand name.

**YOUR HARDWARE DEALER sells QUALITY tools  
and hardware... Buy from HIM**



## POPULAR MECHANICS



# *Any time is time for fun* with a **HARLEY-DAVIDSON**

You've got the "greenlight" to good times, when you own a Harley-Davidson. Fun is around every corner, happiness along every highway in the world's greatest sport — motorcycling! Alone or with gay companions, there's no end to enjoyment. Within easy reach whenever you want to go are gypsy tours, hillclimbs, race meets, sightseeing trips, exciting vacations, all beckoning to new pleasures and adventures. Owning a Harley-Davidson is easier than you think. See your dealer today.

## **HARLEY-DAVIDSON MOTORCYCLES**



**HARLEY-DAVIDSON MOTOR CO., Dept. P. Milwaukee 1, Wis.**  
Send free copy of **ENTHUSIAST** magazine, filled with motorcycle action pictures and stories; also literature on 1948 models.

Name.....

Street or R.F.D.....

City.....Zone.....State.....



# Repair Storm Windows and Screens with **PLASTIC WOOD**



**When making new screens, or replacing old rusted screen, apply thin layer of PLASTIC WOOD around frame after tacking down screen. This gives greater strength to the frame. PLASTIC WOOD can be easily shaped to match broken molding. Valuable in replacing rotted wood in storm windows.**

... dozens of other uses

#### FOR FILLING ...

- Cracks in floors
- Countersunk screws
- Chipped furniture
- Nail and screw holes

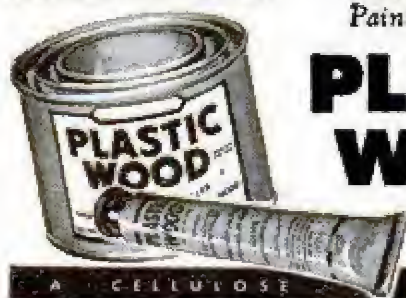
#### FOR REPAIRING ...

- Loose tiles
- Loose casters
- Broken balusters
- Broken furniture

- **PLASTIC WOOD SOLVENT** is indispensable to the home workshop hobbyist for controlling the consistency of Plastic Wood and removing dried Plastic Wood from hands and tools.

T.M. Reg. U. S. Pat. Off.

At all Hardware,  
Paint and 10c Stores



## PLASTIC WOOD

Tube or Can

A CELLULOSE FIBRE FILLER

the red lead terminal on the amplifier and the other phone terminal on the crystal set connects to the blue input terminal clip on the amplifier; the antenna and external ground leads remain the same. The frame of the speaker must be connected to the common ground on the No. 7 lug on the 1H5-GT tube socket in order to prevent oscillation. A 390-ohm resistor in the negative-B lead provides approximately 4 volts of bias for the 1Q5-GT beam-power output tube. Two 45-volt B-batteries and one 1½-volt dry cell A-battery provide power. No on-off switch was used in order to keep cost at a minimum. The amplifier is merely turned on and off by disconnecting the positive A-battery lead. A s.p.s.t. toggle switch may be inserted in the positive A-battery lead if desired. To use the amplifier with a record player, disconnect the audio transformer at X and X in Fig. 3, and substitute the phono-pickup circuit Fig. 3-A using X and X as input terminals. Connect the lever of the volume control to C1 at the terminal strip on the amplifier; one end of the volume control goes to ground on the No. 7 terminal of the 1H5-GT tube socket. Leave condenser C3 in the ground lead. The phono pickup leads are then connected across the outside terminals of the volume control. If the volume control works backward reverse the outside connections. If your record player has a shielded pickup lead, the shield connects to ground. If the pickup is provided with red and black leads, the black goes to ground. Detailed student material list R-365 covering both units is available from Popular Mechanics Radio and Electronics department upon receipt of ordinary letter postage.

## Pulling the Fangs of War

(Continued from page 174)

trained disposal crews. Wandering in the fields, they often step on mines and explode them. Because a cow represents a small fortune, the French farmers are especially cooperative in the work of removing bombs and mines.

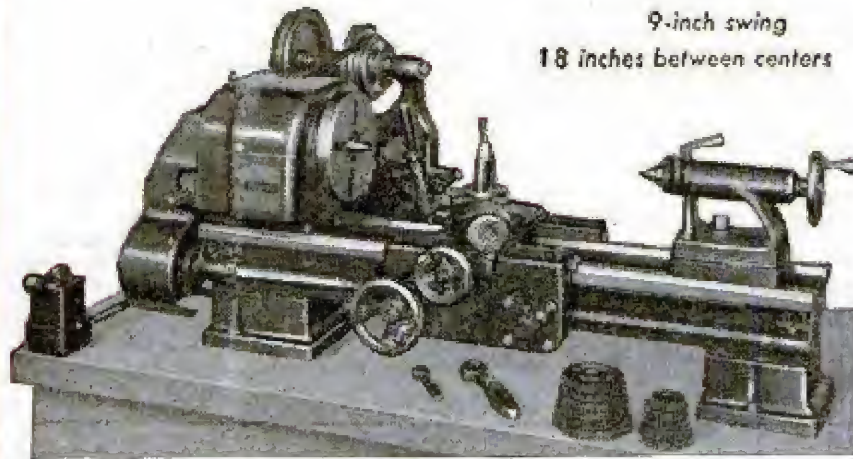
Approximately 1900 minesweepers of European countries are clearing the waterways of that continent. The task will not be finished for several years. There were 493,000 mines laid between 1939 and 1945 and many of them were dropped by planes and therefore not charted. In spite of precautions taken and warnings issued, about 150 merchant vessels, fishing boats and pleasure craft have been sunk by mines in European waters since war ended.

(Continued to page 246)



# Logan

**ACCURACY IN A  
9-INCH SWING**



9-inch swing  
18 inches between centers

**Plus Logan speed,  
ruggedness and  
versatility at \$159.50**

• This lathe will produce precision results on any job you give it, and it retains its accuracy through years of use. Bed ways precision ground to within .0005" of parallelism. Ball bearing spindle needs no bearing adjustment from 30 to 1450 rpm. In brief, it is a LOGAN Lathe built in a compact 9-inch size. See it at your Logan dealer's, or write for information.

**DISTRICT  
OFFICES**

Woolworth Bldg.,  
New York 7, N. Y.  
CO 7-8024

550 W. Washington Blvd.  
Chicago 6, Illinois  
Central 1246

1672 Mission Street  
San Francisco, Calif.  
Underhill 6682

700 Commerce St.  
Dallas 2, Texas  
Central 4075

**LOGAN ENGINEERING CO.,**

Dept. BB-4  
CHICAGO 30, ILLINOIS

**Build Your Own  
ROTARY POWER  
LAWN MOWER  
& WEED CUTTER  
with the Wind-King  
MOWER SPINDLE  
& BLADE**

**\$1875**

FOB  
Merrill,  
Iowa



- Timken Bearing equipped
- Smooth operation at high speed
- Spindle unconditionally guaranteed
- 20-inch tool steel blade — easily sharpened
- Precision built with quality materials
- Designed for efficient, long-lasting lubrication

For further information, write to:

**WIND-KING ELECTRIC MFG. CO.**  
Merrill, Iowa

**REMOVE PAINT  
WITH WONDER-PASTE**



In refinishing furniture, woodwork, etc. all cracked or peeling portions of the old finish should be removed. It's easy with WONDER-PASTE REMOVER. Applied with an ordinary paint brush, this remarkable paste quickly softens up the toughest finish, whether paint, varnish, enamel, lacquer or shellac. Will not run, even on an upright surface. Turns the finish into a soft sludge that comes off easily at every stroke of the scraper. A long-time favorite of painters. Get Wonder-Paste at your paint or hardware store. Write for Wonder-Paste leaflet, and for advice on your particular removing problem.



Wilson-Imperial Co., 119 Chestnut Street, Newark 5, N. J.

# Surplus CAMERAS



Buy direct — avoid higher prices. Millions of dollars worth of aerial cameras and accessories are now available to the public at government established prices. May be used as is, modified, or lens, shutters, motors, and other components obtained for use. W.A.A. prices are often less than value of lens alone!

**WRITE US TODAY FOR**

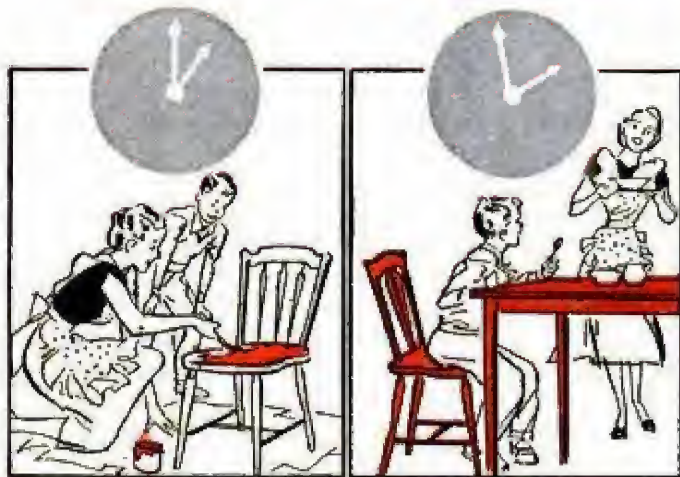
*Complete Listing Catalog*  
**AND PRICES!**

**ABRAMS INSTRUMENT CORP.**

Acting as Agent for  
**WAR ASSETS ADMINISTRATION**  
606 E. SHIAWASSEE ST., LANSING, MICH.



# paint at 1... use by 2!



Easy to apply. Flows on smoothly. Low cost!

Dries dust-free in 17 min. Little does a lot!

## WONDERFUL NEW Stop Watch Enamel DRIES IN 57 MINUTES\*

- FOR FURNITURE IN CONSTANT USE!
- FOR MODELS!
- FOR TOILET SEATS!
- FOR TOYS!
- FOR HANDICRAFTS!



**STOP WATCH ENAMEL** is available at Hardware, Paint and Variety stores in 14 decorator colors: Robin Blue, Royal Blue, Java Brown, Canary Yellow, Foam Green, Jade Green, Forest Green, Pilgrim Gray, Rich Cream, Imperial Red, Orange, Ivory, White and Black.

If your dealer cannot supply you, send \$1.50, plus 25¢ to cover shipping, for 1 qt. of **STOP WATCH ENAMEL**. Indicate color wanted.

**THOMAS C. DUNHAM, INC.**  
Long Island City, New York, Founded 1852

\*Average drying time

## Clinic



## for Homemakers

As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of *Popular Mechanics* invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Ill.

### Oil-Soaked Floor Joist Stains Ceiling

**Q**—Oil leaking from a can soaked a second-floor joist in one of the rooms of my home. This stained the paper on the ceiling. What can I do to stop this?

C. B.—Alpena, Mich.

**A**—If you can get at this oil-soaked floor joist easily, coating it with asphaltum likely would remedy the trouble. However, if you mean that the oil has penetrated through a plastered ceiling, then it would be necessary to remove all the affected plaster and replaster the area.

### Chimney Stains Brick Wall

**Q**—Recently I purchased an old house built of brick. Chimneys at each end are built into the solid brick walls. Following the line of the flues a dark, brownish stain appears on the outside of the walls. I want to paint the house with a white masonry paint, but am afraid this stain will show through. What should I do to prevent this?

A. W.—Lancaster, Pa.

**A**—You are correct in assuming that the stain will "bleed" through the masonry paint. If the bricks are still in good shape, the remedy is quite simple. Clean off all loose material with a wire brush and point up any open joints with mortar. Then apply white asphaltum to the stained area and also cover a foot or so of the wall on either side.

### How to Prevent Sink-Drain Clogging

**Q**—How can I keep a sink drain clean without using an auger every two or three weeks?

J. Z.—St. Louis, Mo.

**A**—First clean it thoroughly with the auger, removing all possible debris. Then, at regular intervals, from 10 days to two weeks, flush the drain with a good commercial cleaner. Follow directions on the can. If this is done regularly and correctly, you should have no further trouble.

### Moisture Condenses on Cold Walls

**Q**—We have a concrete-brick house and when we turn on the gas heater the windows and walls get very wet and water drips to the floor. What can I do to keep the house drier?

W. D.—Santa Monica, Calif.

**A**—If you are using an unvented gas heater—a common type—that is the source of your trouble, as one of the products of the combustion of highly concentrated fuel is water vapor. This condenses on the walls which are several degrees colder than the air in the room. Apparently, the only remedy for the trouble is to vent the gas heater either to a chimney or to the outside of the building in some other way.

(Continued to page 244)



# NOW\_a New Kind of Screening

rustproof! stainproof! never needs painting! lasts a lifetime!



## Don't fuss with screens anymore! Replace old screens with Lumite!

Millions of homeowners have been amazed at this revolutionary plastic window screening. And no wonder it's sweeping the country! Just think of having screens that will *never* rust, *never* rot, *never* corrode. Imagine screens you never have to paint or scrub clean—that never stain the sills or sidewalls of your house. Yes, here's an amazing new kind of screening (woven of SARAN) that's been tested the world over—and proved virtually indestructible! If it's time to rescreen, don't wait, order LUMITE at your Hardware, Lumber, or Building Supply Dealer's today!

**For further information and free sample**  
write Dept. 32, Lumite Division

Chicopee Manufacturing Corporation, 47 Worth St., N. Y. 13, N. Y.



### STAINPROOF!

Guaranteed never to "bleed" or "run"—never to stain the sills and sidewalls of your house. LUMITE keeps its glistening fresh beauty always.



### RUSTPROOF!

Absolutely cannot rust or corrode in any climate. Completely unaffected by hot or cold weather, water, sun, smoke, acid fumes, or salt spray.



### NEVER NEEDS PAINTING!

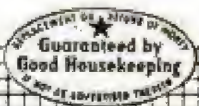
Requires no protective coating. Any dust or dirt that collects on a LUMITE screen can be wiped off in seconds with a damp cloth.



### LASTS A LIFETIME!

LUMITE is unbelievably strong—has greater impact strength than any other type screening by actual test. Lasts as long as your house.

\*®



**Screen once and for all with**

# LUMITE\*



**53¢ VARNISH  
VALUE  
FOR ONLY 25¢**



**TOUGH! HARD!  
UNHARMED  
BY LIQUIDS!**

**★  
FINEST VARNISH  
DEVOE EVER  
MADE**

**★  
Guaranteed by  
Good Housekeeping  
IF NOT AS ADVERTISED TOGETHER**

**DRIES IN 4 HOURS**

(May vary from 3 to 6 hrs.  
depending on conditions.)

Users from coast to coast  
acclaim Devoe 87 Spar as the  
postwar varnish miracle!

Devran\*, the new resin created  
in the Devoe Laboratories, makes  
it the most damage-resistant var-  
nish in generations!

**USE TEST COUPON TODAY**—This offer  
gives you enough to finish a piece  
of furniture or 20 sq. ft. of wood-  
work, floor or linoleum! Mail cou-  
pon direct to Devoe with 25¢ for  
full ¼ pint of Devoe 87 Spar!

\*Patent applied for

#### **87 SPAR TEST COUPON**

DEVOE & RAYNOLDS CO., INC., Dept. J-1  
787 First Avenue  
New York 17, N. Y.

Enclosed is 25¢ for a ¼-pint test sample of  
Devoe 87 Spar Varnish (retail value 53¢)

Name.....

Address.....

City..... State.....

This offer expires May 1st

ANOTHER DEVOE PRODUCT

**DEVOE & RAYNOLDS COMPANY, INC.**

787 First Avenue, New York 17, N. Y.

#### **Moisture Condenses in Oil-Heater Vent Pipe**

**Q**—I have an oil-burning space heater in the hallway. There are 19 lengths of 4-in. vent pipe in all, 8 in the hallway and 11 in the kitchen. The pipe drips water constantly onto the kitchen floor. What causes this and how can I prevent it?

**R. L.—Montreal, Que., Can.**

**A**—Your trouble is caused by condensation of moisture in long, horizontal runs of stove pipe. This is due to the fact that one of the products of combustion of fuel oil is water vapor. Where possible, one remedy that usually succeeds is increasing the rise of the pipes, which correspondingly increases the velocity of the flue gases and helps to prevent the condensation of moisture in such quantities as you describe.

#### **Basement Rain Pipe Thickly Coated with Frost**

**Q**—How can I prevent frost on the masonry walls where a rain pipe enters my basement? On cold days the pipe and the wall all around the pipe are thickly coated with frost.

**A. R.—Winnipeg, Man., Can.**

**A**—According to the sketch you enclosed, cold air coming down the pipe causes moisture to condense on and about the downspout at the point where it enters the basement. Temporarily, you could coat the pipe and adjacent area with a special paint made for the purpose of preventing condensation on water pipes in basements. This, we think, would at least minimize your trouble. However, it does seem that the only permanent remedy is to remove the pipe from the basement, making the installation somewhere outside the building.

#### **Refinishing Painted Furniture**

**Q**—I have a white-enameled kitchen set of maple. Can I take off the enamel, then stain a reddish color and finish with varnish?

**M. K.—Providence, R. I.**

**A**—We doubt the advisability of attempting to stain furniture after paint or enamel has been removed by ordinary methods. It can be done with fair success on work where it is possible to remove all the old finish from the wood. Otherwise, the new finish is likely to be patchy. The reason is that the liquid vehicle in paints and enamel's penetrates the wood unequally, that is, deeper on those areas where the grain is oblique. Unless you can remove all the original finish from such areas, the stain will not "take" uniformly. A wood bleach, in strong solution, will help but still does not entirely eliminate the problem of getting a uniform color in the new stain finish. However, there are several quite simple processes for finishing over the enamel, provided, of course, it is in good condition. To do this, you apply a ground coat first and then wipe with a cloth while wet to give a wood-grain effect. When you get the desired graining, the ground coat is allowed to dry thoroughly. This is followed with varnish alone, or shellac and wax. This will not equal the natural wood grain brought out by a skillfully applied stain finish, but we have seen some very attractive work done on painted furniture by using this method.

#### **Making Stove From Oil Drum**

**Q**—I have tried to make stoves from 50-gal. oil drums by cutting holes in various parts of the drum. The stove always smokes. How can I prevent this?

**D. S.—Brooklyn, N. Y.**

**A**—One method is to install a welded grate to raise the fuel bed above the bottom. Holes should be drilled about two inches or so below the grate.

#### **Leak in Kerosene Line**

**Q**—I have a kerosene heater which is fed from a tank through copper tubing. Kerosene leaks from two joints. If I cut the tubing to make a new connection it will be too short. Is there a way to stop the leaks without cutting the tubing?

**W. S.—Brooklyn, N. Y.**

**A**—White-lead paste applied to the threads usually will stop leaks of this kind. Time must be allowed for the lead paste to set. Lacking the lead paste, plumbers' pipe-joint compound would probably do as well.



# How one application of sensational liquid-type car polish does two jobs!

**1** As you apply Carnu, it **CLEANS!**  
So easy—just apply Carnu with a soft cloth. Rub only hard enough to loosen grime. The liquid dries quickly to a white powder.

**2** As you wipe Carnu off, it **POLISHES!**  
Nothing to it! Powder-dry Carnu wipes off without hard rubbing—and takes dirt with it. Finish sparkles with a showroom shine. Carnu also polishes chrome fittings.



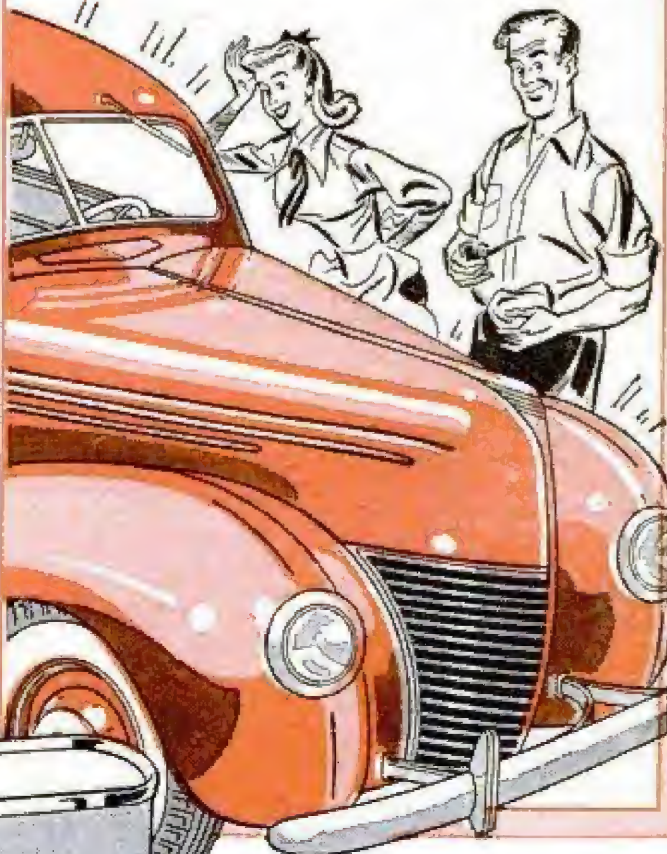
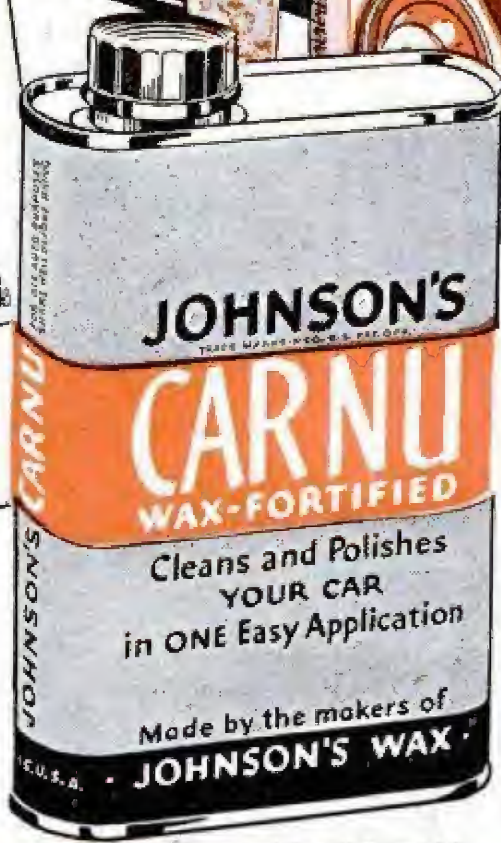
**BEFORE CARNU** The finish is dull and rough with dirt and oxidized paint.



**AFTER CARNU** The finish is bright as a mirror—so smooth that future dust and dirt flick off easily.



Pull up a chair—they're on the air!  
Fibber McGee and Molly  
Tuesday Nights—NBC



Get Johnson's Carnu\* at filling stations, auto supply, hardware, department, grocery or variety stores.

## For Extra Protection... Johnson's Auto Wax



This easy-buffing wax is just the thing for any home handy-man who wants to give his car a professional finish. There's no better protective coating than Johnson's Auto Wax. It guards the finish against sun, heat, moisture. Easier, too, to keep your car clean and shining—dirt can't imbed itself in the smooth, hard, waxed surface. Johnson's Auto Wax is sold wherever Carnu is sold. Try it!

\*Trademark Reg. U. S. Pat. Off.

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**ALL YOURS  
FOR YEARS  
in a Johnson**



Perfected Alternate  
Firing

Dual Carburetion

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Ready-Pull Starter

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Salt Water Protec-  
tive Treatment

Rubber Rotor Pump

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peller Shaft

Grease Seals

Big Grease Capacity

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Absorber



**Yours for YEARS**  
OF SWEET  
PERFORMANCE

#### FREE HANDY CHART

New! Illustrates and charts the 5 great Johnsons for '48. Sent free. Write! Look for the name of your Johnson dealer under "Outboard Motors" in your classified phone book. See him!

**JOHNSON MOTORS**  
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**JOHNSON**  
SEA-HORSES  
for *DEPENDability*

Under the direction of U. S. officers, several hundred Japanese ships are sweeping the waters of Japan and the Philippines. Bomb-disposal crews are de-fusing unexploded bombs dropped on Tokyo, Yokohama, Osaka and other large cities by the B-29s. Still another group is removing from an inland sea naval base 15,000 tons of mustard gas and other poisonous chemicals, putting them in 100-gallon rustproof cans and dumping them into the sea.

It will be a happy day for the world when no more hidden pockets of death lie in the fields, forests and waterways. Until these fangs of war are pulled, there will be no security for many peoples of the world.

## How Do Pigeons Navigate?

(Continued from page 140)

What would happen if pigeons were released between their home and the conjugate point? This interesting question came up and Dr. Yeagley trained 50 birds to home at State College for a new experiment. He released them in pairs every 50 miles on a line between State College and Kearney. The results are significant. Those released east of the halfway mark flew almost in a straight line for State College and the other half flew directly away from State College toward Kearney.

Dr. Yeagley then attempted to disprove the theory that homing pigeons always return to their loft because of some mysterious ability, inherited from their forebears, to sense the direction and distance they are being carried, even though they are drugged or asleep. Three hundred untrained pigeons from homes in Texas, Missouri and New Jersey were released in the region of Hamlet, Neb. According to this popular theory, the birds should have been able to pilot their way back along the railroad tracks to their various homes. Actually, the birds scattered across the country, some making long flights and others short ones. This seems to explode the theory that pigeons have an inherited instinct that does not need to be developed.

Dr. Yeagley does not claim to have fitted together all the pieces of the pigeon puzzle. For example, he doesn't know what organ of the pigeon's body is the navigating instrument that senses magnetic effects and Coriolis force. One of many possibilities is the pecten, a moundlike structure in the pigeon's eye which has no known function. Dr. Yeagley also suggests that other birds may have this homing ability to a greater extent than the pigeon

(Continued to page 248)

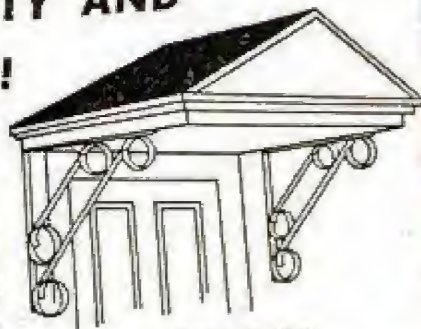




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Now, at low cost, you can dress  
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one. All-aluminum  
— permanently rust  
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## GABLE TYPE

48 inches wide, 32 inches deep,  
5 inches tall. Furnished com-  
plete with 2 ornamental  
brackets to install.

COMPLETE



"Thanks a Million,  
American..."



—a possible partial solution to the mystery of migration—but he has not yet been able to prove or disprove this belief.

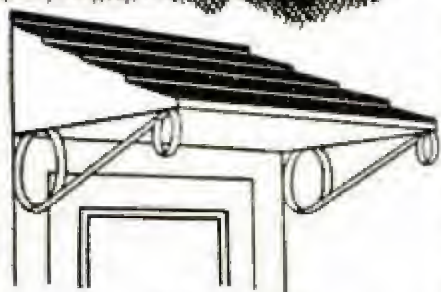
Another pigeon peculiarity is the use of radio and radar waves on their homing ability. When in the presence of powerful radio waves, pigeons have been seen to flutter helplessly, apparently without sense of direction. They have been reported to be released and then to fly





# ALL-WEATHER PROTECTION FOR YOUR DOORWAYS

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VALUE TO YOUR HOME!



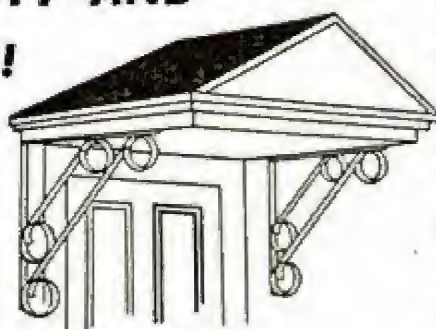
## SLANT TYPE

48 inches wide, 32 inches deep, 9 inches tall. Furnished complete with 2 ornamental brackets ready to install.

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**WELDWOOD**  
PLASTIC RESIN  
**WATERPROOF GLUE**



United States Plywood Corporation, New York 18, N. Y.

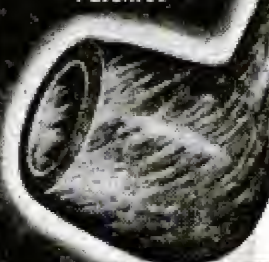
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SCREW-STEM FILTER  
PIPE for \$1**

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**FILTERWELL**  
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LOCKS OUT OF LINE  
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# "Thanks a Million, American..."

YOU SHOWED ME HOW TO  
**MAKE MONEY**  
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Now—you, too, can be your own boss and step into big profits in the building industry as a floor surfacing contractor! Make \$35 to \$50 a day—that's what hundreds of men everywhere

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The American Floor Surfacing Machine Co.  
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Enclosed find 25c in stamps or coin for booklet "Opportunities in Floor Surfacing", telling me how I can start my own floor sanding business.

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—a possible partial solution to the mystery of migration—but he has not yet been able to prove or disprove this belief.

Another pigeon peculiarity is the effect of radio and radar waves on the birds' homing ability. When in the vicinity of powerful radio waves, pigeons have been seen to flutter helplessly in circles with no sense of direction. In one experiment reported to Dr. Yeagley, a pigeon fancier released 20 well-trained birds beneath a broadcasting tower. Most of the pigeons flew around the tower for an hour or more, a few crash-dived in the vicinity and not one bird ever returned to its loft.

Dr. Yeagley plans to conduct experiments seeking an answer to this phenomenon soon, and to determine the effect of violent sunspots, which also seem to impair the ability to home. He will use relatively rare white homers which can be spotted easily and followed by plane.

The scientist suggests that some animals may have the same ability as homing pigeons. He also says it's possible that some of the sickness experienced by high-speed pilots may be caused by movement through magnetic fields rather than just the accelerations resulting from turns at these speeds.

## Guardians of the Rails

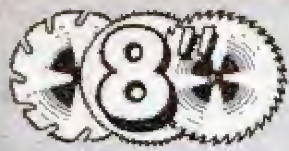
(Continued from page 134)

line unrolls the twine as they advance. This serves as the boundary for the return trip across the field while another ball of twine is being unrolled by the outside man as the next marker.

Guarding millions of dollars worth of valuable freight is one of the less dramatic but more important functions of the railroad police. A single large freight yard may handle from three to five million dollars worth of cargo in one day. Freight thieves work in organized gangs with both "inside" and "outside" operators. Small items, such as watches, perfumes, playing cards, pocket radios, jewelry and clothing are smuggled out on their persons. Larger loot, typewriters, cartons of cigarettes, cigars, gum, table radios or bales of costly cloth are "planted" in some hiding place where they can be smuggled out later. The plain-clothes men who frequent the yards are on the alert for these "plants." Many items in transit are under guard from the time they arrive at the freight house until they are re-sorted and sent on their way. The trained police can spot a tampered package at a glance. These packages are immediately taken to the cooper's office

(Continued to page 252)





# QUALITY

# TABLE MODEL TILT-ARBOR SAWS

OIL IMPREGNATED BRONZE BEARINGS OR DOUBLE SHIELDED BALL BEARINGS, BOTH WITH THE PATENTED BALL BEARING TRANS-AXIAL MOTOR DRIVE

TABLE 18" x 16"

Double  
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\$5 Extra

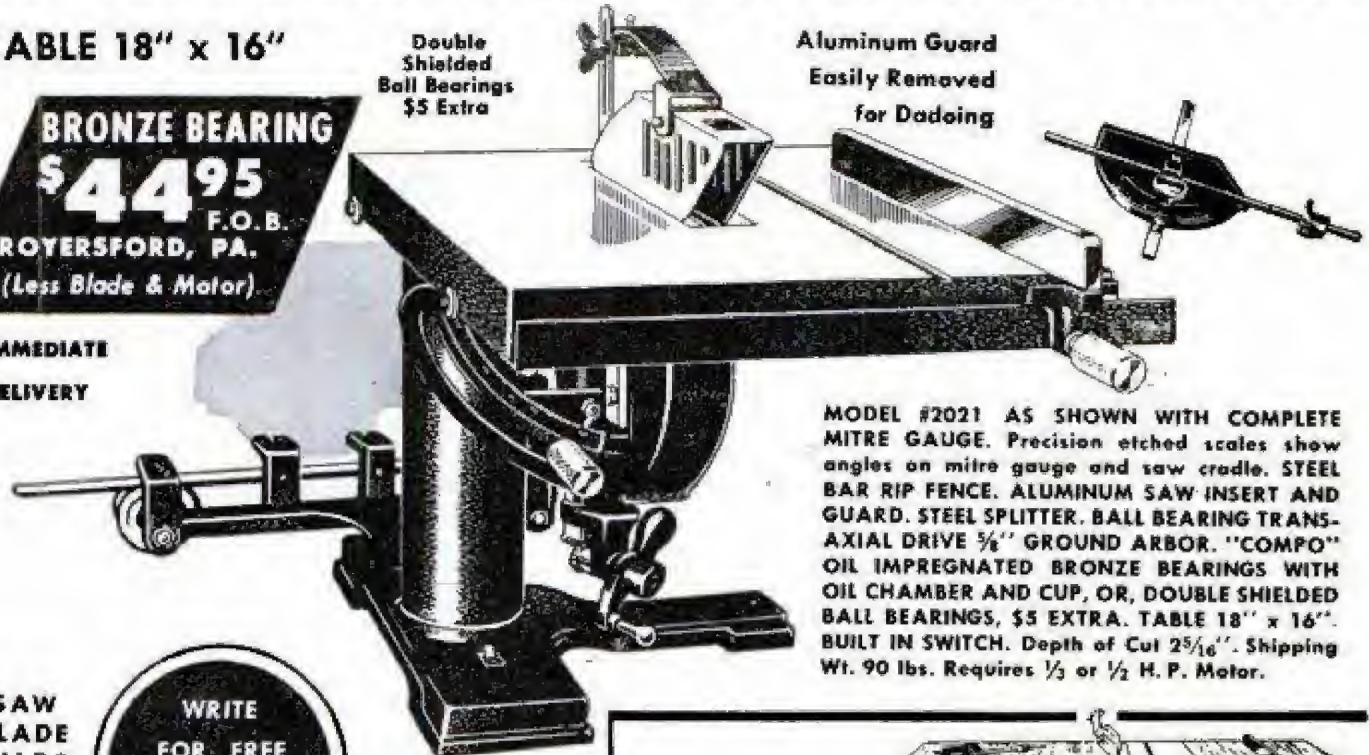
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BRONZE BEARING

**\$44.95**

F.O.B.  
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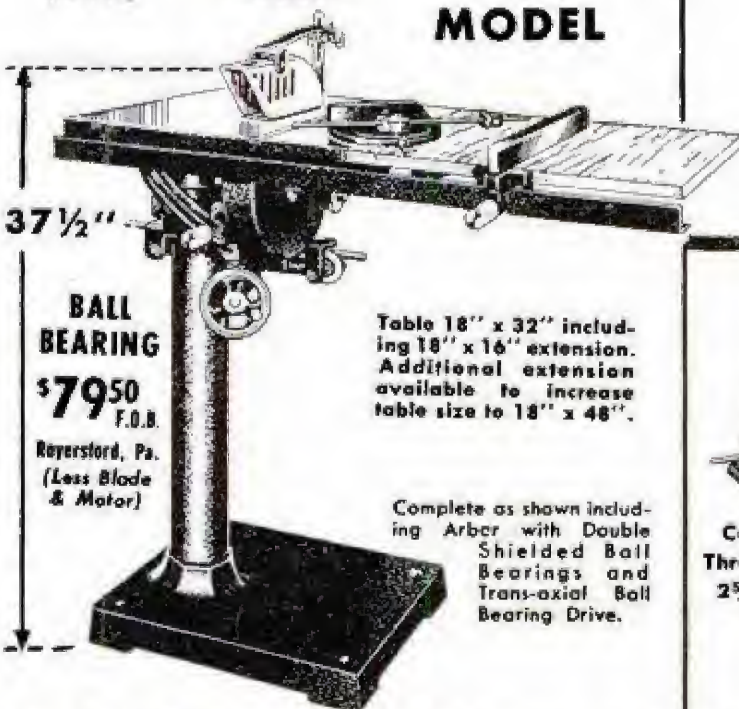


MODEL #201 AS SHOWN WITH COMPLETE MITRE GAUGE. Precision etched scales show angles on mitre gauge and saw cradle. STEEL BAR RIP FENCE. ALUMINUM SAW INSERT AND GUARD. STEEL SPLITTER. BALL BEARING TRANS-AXIAL DRIVE  $\frac{3}{8}$ " GROUND ARBOR. "COMPO" OIL IMPREGNATED BRONZE BEARINGS WITH OIL CHAMBER AND CUP, OR, DOUBLE SHIELDED BALL BEARINGS, \$5 EXTRA. TABLE 18" x 16". BUILT IN SWITCH. Depth of Cut  $2\frac{5}{16}$ ". Shipping Wt. 90 lbs. Requires  $\frac{1}{3}$  or  $\frac{1}{2}$  H. P. Motor.

SAW  
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TILTS  
•  
TABLE  
STAYS  
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FOR FREE  
ILLUSTRATED  
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## FLOOR MODEL



BALL  
BEARING

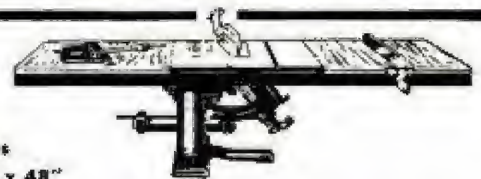
**\$79.50**

F.O.B.  
Royersford, Pa.  
(Less Blade & Motor)

Table 18" x 32" including 18" x 16" extension. Additional extension available to increase table size to 18" x 48".

Complete as shown including Arbor with Double Shielded Ball Bearings and Trans-axial Ball Bearing Drive.

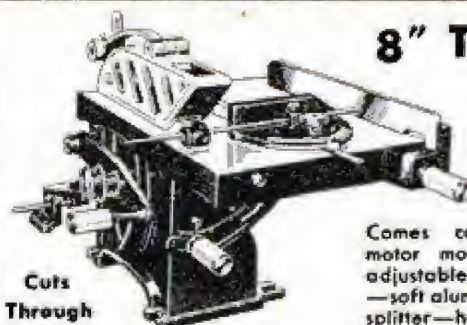
Model #201  
With 2 Extensions  
Makes Table 18" x 48"



TABLES PRE-DRILLED FOR EXTENSIONS



EXTENSION  
MAKES TABLE  
18" x 32"



## 8" TILT TABLE BENCH SAW

Cuts  
Through  
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**\$24.95**  
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Comes complete with Floating motor mount—mitre gauge with adjustable stop—aluminum guard—soft aluminum insert—spring steel splitter—heavy gray iron fence—(no motor—no blade). Table 12" x 14". Tilts to 45°. Oilite bearings. Shipping Wt. 50 lbs.

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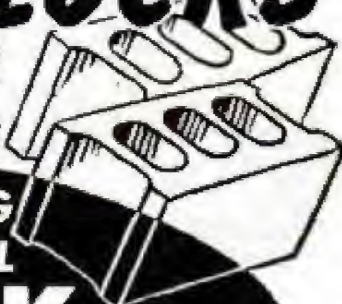
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**CASH IN ON THE BUILDING BOOM!**

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**CAPACITY 1000 BLOCKS PER DAY**

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**CINDER AND CEMENT BLOCKS IN BIG DEMAND . . .  
SELL ALL YOU PRODUCE TO CONTRACTORS, BUILDERS,  
SUPPLY YARDS AT 15c TO 25c EACH. EASY TO START  
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General Block Machine can be operated indoors or out, in space 10 feet by 15 feet. Rugged construction. Vibrator shaft mounted in self-aligning sealed roller ball bearings. Very simple to run. Powered by 1/2 H.P. electric motor, or can be rigged for gasoline engine. Produces up to 1000 8x8x16 Blocks in 8-hour day—superior 3-core type, meeting all Building Code requirements. Can produce 8x8x16, 4x8x16, 8x8x8, chimney corner and cesspool Blocks. Ingredients for Blocks—cinders, cement, sand—readily obtainable anywhere in U.S. Full operating instructions and complete mixing formulas with each General Machine. Immediate delivery anywhere in U.S. Mail Coupon at once for further details, sent Free, without obligation.

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## 1/2 BAG CONCRETE MIXER

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ONLY COMPLETE

Powered with Briggs & Stratton 2.08 H.P. Air-Cooled Gas Engine. Rugged construction, simple design, mixes concrete, mortar, fertilizer, feed. Fully Portable. Good-year pneumatic tires, roller bearing wheels, steel bowl, wheels into hard to get places. Just fuel, crank and start mixing. Instructions and parts list included. Immediate delivery.





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• Comes in POWDER and BIS-KIT form. Both contain *red squill*; are safer around farm animals and pets. POWDER, 75¢; BIS-KITS, 35¢ and \$1.00. If unavailable from your druggist or seedsman, order direct; adding 15¢ for mailing and handling. Money-back guarantee. *The K-R-O Company, Springfield, Ohio.*

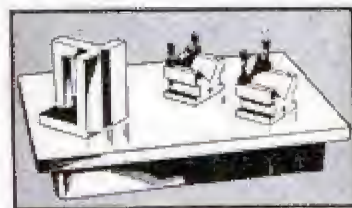
**SOUTH  
BEND**

## NEW SURFACE PLATE, V-BLOCKS, ANGLE PLATE

**SURFACE PLATE** for checking, laying out, etc. Precision ground to .001". 12" x 17" x 3", top 3/4" thick. \$37.50

**V-BLOCKS** for holding cylindrical parts. Precision ground. 1-15/16" x 2-15/16" x 2-1/4". Cap. 1/4" to 2". Per matched pair.. \$32.00

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## MACHINE STEEL

**SMALL  
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From stock — Cold Rolled Rounds, Squares, Hexagons, Flats for machining, welding carburizing. Also Polished and Ground Drill Rods. Write for free stock list and prices.

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**SELF-PROPELLED — MOVES  
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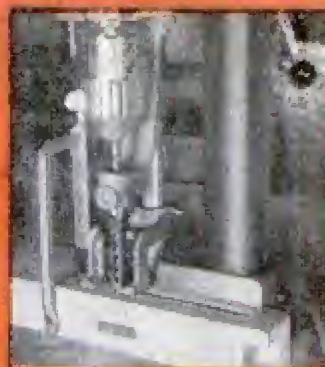


## GARDEN TRACTOR

3, 4, 5 H. P. On market nearly a quarter century. No belts. No chains. Warm drive. 2 clutches. Power turning. All tractors guaranteed. Full line of attachments. Buy direct from factory. Write Dept. 104 for free catalogue.

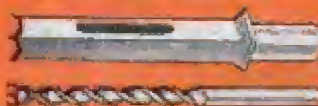


**RED E TRACTOR COMPANY RICHFIELD, WISCONSIN**



## TEACH YOUR DRILL PRESS THIS TRICK

Mortising on the drill press... results in fast accurate work with a skilled "custom" look about it. It's easy when you have a hollow chisel and mortising attachment, held true and tight with a JACOBS HEX-KEY CHUCK.



Your drill press can do many extra jobs when you outfit it with a tight-gripping JACOBS CHUCK. Mortising on the drill press is just one example of how your home workshop equipment multiplies in value when you enlist the aid of JACOBS CHUCKS.

Get greater gripping power... Better accuracy... Longer life with Jacobs' New Rubber-Flex Collet Chucks — Designed particularly for home workshop use.

Exclusive, bonded rubber-and-steel construction... no loose jaws... no springs... not harmed by oils or coolants. Real precision chucks at popular prices. **SEE THEM AT YOUR LOCAL HARDWARE DEALER'S.**

## IF IT'S A JACOBS... IT HOLDS



**HEX-KEY CHUCK**... fits 1/2" or 3/8" drill press spindles—motor shafts—jack shafts. With Morse taper arbor, fits lathe headstock, tailstock, 4 models, capacities to 1/2"

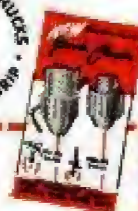


**HAND-TITE CHUCK**... fits all hand tools and power tools with threaded spindles... used on polishing heads, bench grinders, flexible shafts, etc. 3 sizes... capacities to 1/2". Models to fit 3/8-24, 1/2-20 and 1/2-24 threaded spindles.

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**Jacobs Chucks**

Have The Rubber-Flex Collet  
Its Parallel Bite Holds True And Tight



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Please send me your new illustrated folder on the Jacobs Rubber-Flex Hex-Key and Hand-Tite Chucks.

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Now you can get professional results in painting, even if you've never painted before! The new Lowell Electric Painter actually gives a fine "factory-finish." Paints rooms, furniture—even your car! At stores, everywhere.



### PAINTS BEHIND RADIATORS!

Lowell Electric Painter actually atomizes paint. Covers area in a minute. Directional nozzle sprays paint straight ahead, up, down or sideways.

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Use any kind of paint with the Lowell Electric Painter—enamel, flat paint, or varnish. Holds a quart. Easy to use. Small, efficient AC/DC motor. Weighs 8 lbs.



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Write for fascinating, new booklet: "40 Ways to Beautify Your Home." Send 10c to Lowell, Dept. 72, 589 East Illinois Street, Chicago 11, Illinois.



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"Thoro-Spray"\*

Electric Painter  
COMPLETE  
No Extras To Buy

**\$34.95**

Slightly higher in western territories.



\*T. M. REG. U. S. PAT. OFF.

**LOWELL**  
*Manufacturing Co.*  
World's Largest Manufacturer of  
Sprayers and Dusters Exclusively

where they are opened, the contents counted, losses recorded and the manufacturer notified.

Any person who travels by rail has some time or other brushed elbows with a plain-clothes man in the station. There are usually at least one or two of these officers on duty, on the alert for pickpockets, confidence men and other criminals who prey on travelers.

The police say pickpockets are easy to spot. They work in pairs and both men buy tickets for a short trip. Then they wait for a "tip" which is a large crowd of travelers lined up to get on a train. The pickpockets look over the tip and select their victim, possibly a well-dressed man who had made the mistake of feeling his wallet several times to make sure it was there. Then the pickpockets move in, one in front of the victim and one behind him. When the line starts to move the front man drops something or creates some delay which causes the victim to stop. The pickpocket behind bumps into him sharply and the victim's wallet is lifted.

During the war years the railroad police did an outstanding job in protecting the lives of troops in transit, in guarding ammunition trains, and in delivering suspicious characters to the FBI. One of the latter was found in the Chicago yards of the Illinois Central taking photographs of the tracks and posing as a model-railroad enthusiast. His films, however, were all of the big Stevens Hotel which overlooked the yards and was serving as an Army headquarters. This is just one of scores of similar incidents all over the country.

Taking another leaf from the pages of the FBI, the railroad police today are stressing crime prevention as well as detection. Even "knights of the road," otherwise known as bums or drifters, are handled with care. In some cases in the old days they were handled roughly, thus making lifelong enemies for the road and potential train wreckers. Now the bums are frequently handed over to proper legal authorities for punishment.

In the near future the special agents who ride the trains hope to make radio hookups with local and state police. This would expedite the handling of any disturbance of a criminal nature that might occur en route.

Jesse James wouldn't have a chance today:

With a voltage estimated in the millions and a current equal to that flowing into 300,000 homes, a tremendous lightning bolt that struck a Pittsburgh skyscraper recently is believed to be the most powerful ever recorded.



# Performance!\*

Boat Length	Boat Weight	Boat Load	1-12		1-20	
			Trolling Speed	Top Speed	Trolling Speed	Top Speed
12 ft.	115 lbs.	One	1.01 mph	12.5 mph	1.06 mph	20.7 mph
13 ft.	165 lbs.	One	.83 mph	12.1 mph	1.18 mph	18.8 mph
14 ft.	190 lbs.	One	.97 mph	10.9 mph	1.03 mph	16.2 mph

\* Tests conducted by an independent laboratory. Speeds are up-wind, down-wind averages.



## Two Great New Motors

# Scott-Atwater 1-12 AND 1-20

### A New Experience in Outboard Motoring

What do you want in an outboard motor? Sensational performance? Faithful reliability? Simplicity of operation? You'll find extra measure of all of these in the new 1948 Scott-Atwater Motors! Plus luxurious styling and real Scotch value.

Your dealer will gladly demonstrate Scott-Atwater's superb performance and all-weather, botherfree reliability. See the new porous metal filter (exclusive) that keeps even water out of the fuel system. Scott-Atwater's new high-pressure water pump (exclusive) permits slowest trolling for hours on end without over-heating, and super-ignition keeps spark plugs clean all season long, just as the super-sealed lower gears require attention but twice a year. Truly, Scott-Atwater gives you the kind of reliability you'd expect only in a fine motor car.

Scott-Atwater's performance is amazing! And its "A B C" simplicity of operation and distinguished styling impress you immediately. Best of all, you get more O B C Certified horsepower per dollar. Write Dept. PM48 for literature.

One mph trolling  
Twelve mph top speed

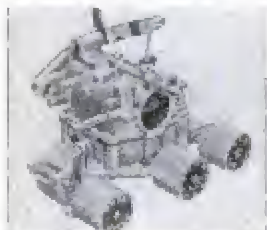
One mph trolling  
Twenty mph top speed



**Multiple Feather Intake Valves**—Give phenomenal idling and top speeds by automatically changing timing to admit optimum charge at all speeds (not possible with other types of valves) . . . flood-proof for easy starting, and wear-proof.



**Full-Expansion Exhaust**—plus the jet-silenced cut-out. Reduces back pressure to an absolute minimum . . . a major contribution to Scott-Atwater's remarkable high speed . . . slow trolling . . . and easy starting.



**Concentric Bowl Carburetor**—With automobile type dual jets gives correct mixture at any speed, even tilted to 50°.

**New Type Magneto**—Shoots hotspark for one-pull starting, clean-plug trolling.



**High Pressure Water Pump**—Oscillating rotor type located on drive shaft operates 60% faster giving positive circulation at slowest trolling. New synthetic rubber out-wears metal. Patent pending.

Scott-Atwater 1-12  
Deluxe Single with  
Auto. Recoil  
Starter, 3.6 h.p.  
(OBC Certified @  
4,000 rpm).

Also available,  
Scott-Atwater 1-20  
Deluxe Alternate  
Firing Twin,  
7 1/2 h.p., (OBC  
Certified @ 4,200  
rpm).



© 1948 Scott-Atwater  
Manufacturing Co., Inc.  
Minneapolis 13, Minn.





F & S PRIZE WINNER

# Wonderlure



New BABY FLYROD, 1/4 oz., \$1.10.  
Ready APRIL 1.

## HAVE YOU SENT IN A NAME?

Send a catchy name in at once for the BABY FLYROD LURE—looks just like its DADDY—the Wonderlure above. Then write 25 words giving reasons for name. Send in as many names as you care to. Be sure to attach a Makinen Box Top to each entry.

## WIN CHEVROLET or \$500 CASH 2000 Other Valuable PRIZES

Get lucky — Why not try. Other prizes are Karriall Trailer—Television Set—Canoe—Johnson Sea Horse—Radios—Rods—Reels—Camp Stoves. Etc. Open to all, boys, girls, men and women. Contest closes Sept. 30, 1948.

**GET FACTS TODAY!** Don't Delay. Circular describes all prizes, rules, etc. Stop at your dealer or write us. Thousands of chances to WIN with names or photos.

**IF DEALER CAN'T SUPPLY,** send us his name check or money order and we'll ship lures postpaid. The more names you send in, the more chances you have to WIN. Give color of lures wanted: RED HEAD—FROG—PERCH—ORANGE—RED SPOT—YELLOW RED SPOT—MOUSE—BLACKIE. Don't Delay! Enter Contest Today!

## MAKINEN TACKLE CO.

Contest Editor, Dept. PM4, Kaleva, Mich.

F & S PRIZE WINNER



**WADDLE BUG** Surface Killer 3/8 oz. \$1.10  
8-Colors



**HOLI-COMET-Diver** 3/8 oz. \$1.10  
8-Colors



**FLUTED MAKIDEVL** Weedless Spoon 1/2 oz. 85c  
8-Colors



# MENDS

## DISHES, TOYS, ETC.

It's clear, water-proof, flexible, durable.



# DUCO CEMENT

REG. U. S. PAT. OFF.

## Every Driver Needs...



## HANDE-FEED

## Finger-Tip Gas Control

only  
**\$4.95**

Postpaid  
Complete

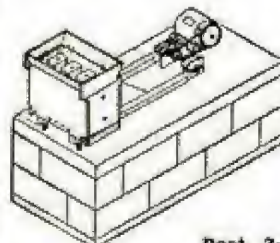
**DRIVE RELAXED!** ... Install HANDE-FEED on your car and MINIMIZE DRIVING FATIGUE! Installed in about 15 minutes on most cars. Connects directly to carburetor. RELIEVES AND RELAXES THE FOOT. Minimizes back-roll on up-hill starts. Simply lift lever to increase engine speed, when released engine idles. Pivots for use with right or left hand. Does not interfere with gear shift or steering. Chrome finish. Complete instructions with every unit. \$4.95 postpaid. Send check or money order, or sent C.O.D. plus postage.

TRANS-CONTINENTAL IND., Dept. PM-2, 818 Olive, St. Louis 1, Mo.

## STAY HOME AND MAKE MONEY!

—Men! Women! Get into profitable, uncrowded profession you can operate from your home or small office after short home training course. No capital required. No goods to buy. No age limit. Others earn \$50.00 to \$100.00 per week making famous Stephenson corrective foot devices to order. Foot sufferers everywhere pay gladly for relief. Send today for FREE BOOKLET.

STEPHENSON METHOD, Established 1894, 12-20 S. Market St., Boston, Mass.



## BUILD THIS CONCRETE BLOCK MACHINE

Sell blocks; or build your home, garage, barn at 1/2 cost by making and laying your own blocks.

This simple machine which you can build yourself at a cost of about \$15 (excluding motor) will make a block in 30 seconds using only one form. 2 to 4 forms can be used on each vibrator.

Power driven concrete mixer plans also. Send time for details and "How to Make and Lay Blocks."

## U-BUILD-IT SERVICE

Dept. 3-A, 206 West Wilder Ave., Tampa 3, Fla.

## WRITE FOR YOUR FREE COPY OF THE NEW KRW HYDRAULIC PRESS BOOK

Describes all manner of Production and Shop Work on KRW Hydraulic and Bench Type Arbor Presses. 32 pages illustrating the new KRW Hand-operated, Electric-operated and Air-operated Hydraulic Presses.

Write for your copy today.



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Builders of Shop Equipment for Ford Dealers Since 1916





# U.S. NAVY 7X50 PRISM BINOCULARS WITH COATED OPTICS



Used but in  
Excellent Condition

## \$95

Complete with leather  
carrying case and sling

Universal. 6x 30 Navy Prism Binoculars, used but in  
excellent condition, complete with leather \$42.50  
case and sling straps. ....

With Coated Optics. \$10 Extra.

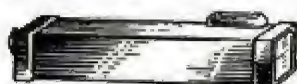
Field Glass, 4X 40 Wollensak. Ideal for bird \$17.95  
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Engineers All Metal Army Type Hand-Sighting

## LEVELS

### \$2.00

PRECISION  
QUALITY



Send \$1.50 for 3rd Edition of Gun Digest with our complete  
catalog of new and used guns, etc. Our separate catalog 25c.

**PUBLIC SPORT SHOPS**

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No COD's

## NEW 30" SHEET METAL BRAKE



Forms angles, channels, vees, flanges, locks, zees,  
boxes. Handles 26 gage sheet steel, heavier gages  
of aluminum, copper, plastic, etc.  
Portable. Can be held in a bench  
vice, or bolted down. All steel con-  
struction. Wt. 40 lbs. \$24.50  
Shipped exp. collect. ONLY

12" BRAKE. Cast iron and steel  
construction. Price, \$14.50 PP.

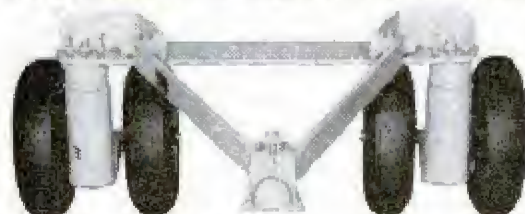
18" CURVE FORMER. Forms cylinders, round corners and  
cones in sheet metal and strap iron. Price, 10.00 PP.

WISE IRON BENDER. Forms rings, hooks, eyelets, etc.  
in 1/2" round or square; 1/4" up to 2" wide in bar iron.  
Price \$10.00 PP. For bending 3/4" pipe, \$2.00 extra.



SHEET METAL PLIERS. 21 1/2".  
Forms angles, channels, etc.  
\$2.00 pp. All items guaranteed.

WISE BRAKE MFG. CO., Dept. P4, 1318 So. 30th Ave., Omaha 5, Nebr.



4 WHEELER  
(Illustrated)

### \$175

2 WHEELER  
\$125

**WATSON DOUBLE-ACTION HYDRAULIC TRAILER DOLLY**

60 miles per hour SAFELY — all day

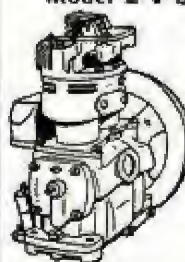
**THE WATSON AUTOMATIC MACHINE CO.**

Glendale, Calif.

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## AIR COMPRESSORS

Model 2-V-S-4-V-A Bendix-Westinghouse 4 cu. ft.



Govt. Surplus, 2 cylinder Bus and  
Truck Type. Ball bearing crank shaft.  
Pressure feed oil system. Positively  
one of the finest and most accurately  
built air compressors on the market.

Original Cost Over \$140.00

In good operating con-  
dition with 30 day writ-  
ten guar-  
antee, . . . . \$3450

Special  
Low "as is" \$2950  
price . . . .

Accessories available for compressors, air regulators, safety valves,  
air gauges, control governor, misc. fittings, hose, paint guns.  
Write for Prices and Catalogue

**MIDWEST SURPLUS SALES CO. 1520 LOCUST ST. KANSAS CITY, MO.**

"Paint-it-Yourself"

# \$345

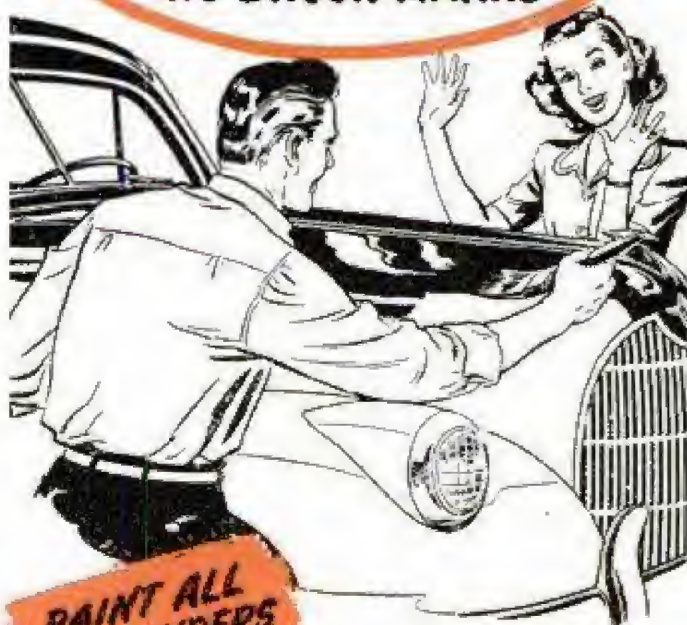
## PAINTS YOUR ENTIRE CAR WITH

ONE COAT COVERS

## NU-ENAMEL

TRADE MARK REG. U. S. PAT. OFFICE

NO BRUSH MARKS



PAINT ALL  
YOUR FENDERS  
FOR \$195  
ONLY

ASK YOUR  
**NU-ENAMEL**  
DEALER FOR THIS  
INSTRUCTION FOLDER



Contains the step-by-  
step story of how you  
can Paint-It-Yourself  
with Nu-Enamel and  
get a professional  
looking job.

## It's EASY! - It's FUN!



# Listen, pal- HERE'S A FISHIN' FOURSOME THAT'S TOPS!



The No. 411 South Bender rod—the No. 750 Perfectoreno reel—a Black-Oreno nylon line—a world-famous Bass-Oreno lure... Man, there's matched tackle that's tops. It's quality-built for perfect casting and the finest of fishin' fun.

## NO. 411 SOUTH BENDER ROD

"Action you've never experienced before in a rod," anglers say. It adds a new thrill to bait casting. Controlled flexibility produces a live suppleness that gives just the right whip for perfect, effortless casting. Length 4' 11" .. \$15

## NO. 750 PERFECTORENO REEL

*No Thumbing—No Backlashes*

Makes casting easy, effortless and a real pleasure. Precision-built. Level winding. Chrome-plated frame .. \$10 Others priced at . . . \$11 and \$13.50

## NO. 973 BASS-ORENO

*Famous Fish-Getter*

World's greatest—and most imitated—bait. Darting, diving action that gets results. Six finishes, \$1.10 each. Also available in 4 other sizes .. 65c to 90c

## BLACK-ORENO LINE

*The Line You Can Trust*

World-famed bait casting line braided of nylon. Smooth finish, long-lasting quality. Easy casting. Waterproofed. 12 to 35 pound test. \$1.35 to \$2.50 per 50 yard spool.

## FREE! NEW '48 BOOK ON FISHING

"Fishing—What Tackle and When" shows South Bend and Oreno Tackle. Color pictures of fishes. Fly and bait casting instructions. Every fisherman needs a copy. Write for it today. FREE!

SOUTH BEND BAIT CO., 891 HIGH ST., SOUTH BEND 23, IND.



# SOUTH BEND

*A Name Famous in Fishing*

## Architecture From the Ground Up

(Continued from page 168)

the structure as though they had lived in it.

The workshop is equipped with power tools, but most of the model work is fine craftsmanship by hand. Many of Wright's buildings call for stonework, and each stone is represented in the finished model by a tiny piece of carved wood.

To live at Taliesin is to live creative architecture from the ground up. Changes in the terrain of the estate are planned and executed by the students. Landscaping to the apprentice has become the art of preserving the natural beauty of an area instead of creating a new setting as a backdrop for a building of foreign design. Steam fitting and carpentry aren't taught—they're learned by doing the job.

Each winter the entire school moves to Arizona to take up residence at Taliesin West, the desert estate built by apprentices. This sprawling building is as rugged as the Arizona wasteland, jutting out of the ground like the huge rock slabs that surround it. It was started from packing boxes and canvas in 1938 and is still expanding.

Life at Taliesin, either in Wisconsin or Arizona, is a cooperative enterprise to maintain the school. Students tend the garden, prepare and serve the food, wash their clothes, study and work together.

Wright also develops the talents of his students in some of the arts allied to architecture. For example, the few women students and the wives of the men work at looms weaving many of the fabrics that decorate the buildings. Furniture is designed as an integral part of each building.

By encouraging his students to express themselves naturally in their work, Wright hopes to train a new generation of architects, men who can build structures that seem a part of the earth itself.

## Here's the New Crop of Light Cars

(Continued from page 101)

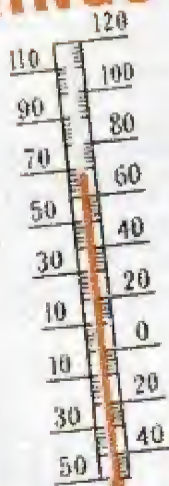
Keller, president of the company, and a veteran of the automotive business, points out that the motorist will find on his cars the usual refinements such as steering-wheel shift lever, electric gasoline gauge, heat indicator, sealed-beam headlights, toe dimmer switch, clutch-pedal starter and adjustable seat.

Playboy Motor Car Corporation at Buffalo, N. Y., is offering a three-passenger convertible coupe and plans to build only one model. An outstanding feature of this car is an all-steel disappearing top which

(Continued to page 260)



# SEALED POWER PISTON RINGS



**FRANCHISED  
DEALER**



**EXPERT  
ENGINE SERVICE**

**GET THAT "NEW CAR FEEL" AGAIN!**  
**SEE YOUR SEALED POWER  
FRANCHISED DEALER!**



© 1948, Sealed Power Corp.

**G**ET the same thrill from your old engine that it gave you when new—when it seemed to have wings! On some auto repair shop near you is this thermometer sign—the sign of your Sealed Power Franchised Dealer. Let him put new life in that old engine and save you a lot of money on gas and oil.

He has a set of Sealed Power Piston Rings specifically engineered to do the best possible job in your engine, whatever the make, model, or cylinder wear condition. When he gets through installing these rings, you'll thrill to that "new car feel" again.

Your Sealed Power Franchised Dealer uses

Sealed Power Piston Rings because they are the best piston rings made, the choice of engine builders for 37 years. Sealed Power Ring Sets include the famous MD-50 Steel Oil Ring—THE ONLY RING WITH THE FULL FLOW SPRING.

Send a postal for illustrated, informative new booklet on 7 ways to save oil. It's free and may save you real money. Sealed Power Corporation, Dept. G4, Muskegon, Michigan. In Canada: Stratford, Ontario.

*Your Sealed Power Franchised Dealer also handles Sealed Power Pistons, Cylinder Sleeves, Valves, Water Pumps and Chassis Parts.*

**Sealed Power**

**PISTON RINGS**

BEST IN NEW CARS!

BEST IN OLD CARS!



# BALL BEARING STEEL WHEELS

**Complete With Wheels, Tires & Bearings** Made To Outwear Other Type Wheels

SIZE	TIRE	BEARINGS	LOAD	ONE	TWO	FOUR
12"x2 1/2"	Semi-Pneumatic	Ball 1/2" or 5/8"	150 lbs.	\$ 5.50	\$10.00	\$18.00
12"x3"	Semi-Pneumatic	Ball 1/2"				
		Bronze 3/4"	340 lbs.	\$ 7.00	\$13.50	\$26.00
10"x1 3/4"	Semi-Pneumatic	Ball 1/2" or 5/8"	125 lbs.	\$ 3.00	\$ 5.50	\$10.00
10"x2 1/2"	Semi-Pneumatic	Ball 5/8"	250 lbs.	\$ 5.50	\$10.00	\$18.00
8"x1 3/4"	Solid	Ball 3/4"	640 lbs.	\$ 8.00	\$15.00	\$29.00
6"x2"	Solid	Ball 1/2"				
		Bronze 3/4"	340 lbs.	\$ 4.00	\$ 7.50	\$14.00
4.00"x8"	Pneumatic	T.R. 1"	700 lbs.	\$13.50	\$26.00	\$50.00
5.00"x8"	Pneumatic	T.R. 3/4"	700 lbs.	\$15.50	\$30.00	\$59.00

The above Pneumatic Wheels are Complete With Wheels, Bearings, Tires and Tubes . . . 4 Ply Tires for 3/4" and 1" Straight Axles. (Also 18", 21" and 23" High Speed Auto Type Wheels.)

SEND 10c FOR CIRCULAR: On Power Racers, Steering Wheel Assemblies, Auto Type Axles, Parts, Sulkies, Etc.

OSBORN WHEEL COMPANY, 115 So. Main St., Dept. P-4, Doylestown, Penn.



**- NEW -**

## 1948 Model Racers

MODEL "A" CHASSIS . . . Price \$39.75 with 10" Semi-Pneumatic Wheels.

MODEL "B" CHASSIS . . . Price \$56.00 (shown above) 12" Semi-Pneumatic Wheels.

MODEL "C" CHASSIS . . . Price \$103.00 with 16" Pneumatic Wheels.

Less Engines and Transmissions

Also sold Complete With 1 H.P. to 6.6 H.P. Gasoline Engines

25% DEPOSIT ON C.O.D. ORDERS

**ORDER NOW**

Add 10% for Prepaid Shipment in U.S.A.

## Do a Better Job WITH ONE OF THESE EMPIRE LEVELS

**SMALLEST, MOST HANDY AND ACCURATE LEVEL MADE.** "Cigar-shaped"—no sharp corners to tear pocket. Aluminum stock. Only 3 oz. wgt. 9" long. Has Level, Plumb, 45° Vials.

### EMPIRE TORPEDO LEVEL



No. 26 . . . \$2.00



### ALUMINUM LEVEL — No. 151

Cast and Machined, a Beautiful Tool, with Patented, Removable Level and Vial.

With 2 Plumb, 2 Levels, 2 — 45° Vials. 18" . . . \$6.00

24" . . . \$6.50 28" . . . \$7.00

Order EMPIRE LEVELS from your local dealer. Write direct for literature.

## EMPIRE LEVEL MFG. CO.

BOX 97, DEPT. P-251, MILWAUKEE 13, WISCONSIN

## PROTECT YOUR LATHE



Covers for SOUTH BEND, ATLAS, LOGAN, CRAFTSMAN, etc. 9" and 10" lathes

Heavy Dust Tight Canvas Drills, Securely Stitched, Dark Blue, Tailored to Fit

Send \$7.69 and this ad. Cover will be sent Postpaid in U.S.A. Advise make of Lathe, Length Overall, Back or Underneath Motor. Covers for Anything — Prices on Request.

The CRAMSON Co., P. O. Box 184, Hales Corners, Wis.

## ELECTRIC MOTORS

### NEW HEAVY DUTY MOTORS

Nationally known makes. Guaranteed capacitor type, ball bearing heavy duty motors, 110/220 volts, 60 Cycle AC Single Phase, 1725 RPM.

1/4 HP	Wt. 30 lbs.	\$24.00
1/2 HP	Wt. 36 lbs.	\$34.50
3/4 HP	Wt. 50 lbs.	\$44.00
1 HP	Wt. 80 lbs.	\$57.00

These motors also furnished in 3450 R.P.M. at same price. Prices are F.O.B. Chicago. Immediate delivery. **SOLD ON MONEY BACK GUARANTEE.** Send check or money order today.

**C & M EQUIPMENT COMPANY**



DEALERS — WRITE . . . 1831 S. State St. Dept. D-4, Chicago 16, Ill.



FOR MOPPING

FOR WAXING

FOR CLEANING RUGS



FOR WALLS

FOR WINDOWS

FOR AUTOS

Hands Never Touch the Water—Can be put in Boiling Water. Housewives Like It.

48" Long Handle

## Sales QUICK, EASY Every Locality

SALES ARE EVERYWHERE . . . Sells quick to Taverns, Clubs, Hotels, Hospitals, Stores, Restaurants, Large and Small Buildings and the Homes . . . Scores can be sold on a single street . . . Note the Drain Bracket in the illustration . . . This squeezes out the water so thoroughly that HANDS NEVER TOUCH THE WATER . . . Makes no difference what you ever sold, you will like this proposition . . . Your name on a Post Card will bring you FREE PARTICULARS.

CELL-U-MOP CO., Dept. P-4 FREEPORT, Ill.

## ... Quick Easy Way to BIG PROFITS

### Read What Others Are DOING!

"Enclosed you will find 56 orders representing 9 1/2 hours' work on Monday and Tuesday."

"Enclosed are twelve orders secured after supper this p.m."

## Housewives are Enthusiastic

Everyone that sees this outstanding Cell-U-Mop immediately wants one . . . That's the reason why our distributors are so successful . . . You also have the advantage of our other QUICK SELLING PRODUCTS that step up your Volume Sales and Profits.

### • We Teach You How •

Gets down under and around for MOPPING, DUSTING or WASHING

DOES THE WORK OF 6 TOOLS IN 1

Get Choice Territory NOW!

Holds 20 times its weight in water.

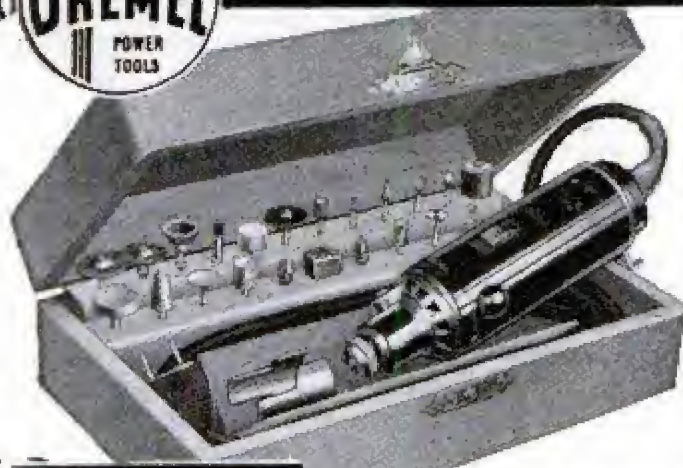






# MOTO-TOOL

THE "POCKET-SIZE"  
MACHINE SHOP



## A SHOP-TESTED TOOL

Moto-Tool is backed by over 10 years of industrial use . . . packs extra years of pleasure . . . yet, due to increased production, pre-war prices still prevail!

About 27,000 R.P.M.  
Cuts Cleaner . . .  
Saves Cutters



## LOOK FOR THESE MOTO-TOOL FEATURES

Approximately 27,000 R.P.M. plus dynamically balanced armature provides vibrationless finger-tip control. Moto-Tool has oil-less, sealed bearings • Patented automatic chuck lock pin • Over-size armature shaft, hardened, ground, polished • 110 Volt, AC-DC motor • Sliding snap-type switch • Cord protector • Shock-proof bakelite housing • Dust-filtered air-cooling system • Weighs only 13 oz.

## New DREMEL DRILL PRESS

Only \$9.95  
(Less Moto-Tool)

Here's a light, portable precision drill press at an amazingly low price. Just the thing for creating costume jewelry, model making, wood carving, routing, etc. Utilizes Model No. 2 Moto-Tool, which can be raised or lowered, swung in any direction or quickly removed in a few seconds for off-hand use. Drill Press stands 12" high. Base is 6 3/4" x 4". Weighs approximately 3 1/2 pounds.



HERE'S BIG VALUE!  
MODEL No. 1

## MOTO-TOOL KIT

Only \$17.50

This popular Kit contains the smaller, lighter Model 1 Moto-Tool and 24 accessories in attractive, heavier-finish wood box. It's the biggest bargain in the field.

## MOTO-TOOL KIT No. 2

With 23 Accessories (HIGH SPEED STEEL Cutters, Grinding Wheels, Polishing Accessories)

Only \$23.50

**MONEY-BACK GUARANTEE:** Buy Dremel Moto-Tool from your dealer. If he cannot supply you, order direct on 10 day trial, money-back guarantee. Shipped postpaid for payment in full (send check or money order); or send only \$2, we will ship C.O.D. You pay postman balance plus postage.

DREMEL MANUFACTURING COMPANY • DEPT. 118-D • RACINE, WIS.

## Dexter UNIVERSAL LATHE CHUCKS

IMMEDIATE DELIVERY. Shipped postpaid from stock same day order received. Precision accuracy and construction assure you complete satisfaction.



Size	Fits Spindle	Price (Postpaid)	Note:
2"	1/2"-20	\$16.00	5" chuck also to fit following spindles
3"	1/2"-20	17.00	3/4" x 16
4"	1"-8	21.00	1" x 10
5"	1 1/2"-8	25.50	1" x 12
6"	1 1/2"-8	33.00	1" x 14
			1" x 16
			1 1/8" x 7

## THE LEAVITT MACHINE COMPANY ORANGE, MASSACHUSETTS UTILITY CABINET

36 Roomy Compartments  
4-7" Drawers with Removable Partitions

A Thousand Uses For  
**HOBBYISTS  
MECHANICS  
DRAFTSMEN  
TECHNICIANS**

For home workshop, factory, laboratory, garage, outdoors, fishing and hunting. Made of heavy gauge aluminum. Strong airplane construction. Sag proof—Rust proof.



\$2.98  
plus postage

Shipping Weight 2 lbs. 8 ozs.

Out out this coupon and send with money

NAME.....  
ADDRESS.....  
CITY.....STATE.....  
Enclosed find check or money order for \$2.98.  
**THE KNICKERBOCKER CO. ST. CLAIR, MICHIGAN**

## DON'T HIT IT...TAP IT!

Now! You can have the  
right hammer for  
every job!



## ALL-PURPOSE HAMMERS

Here's the handiest trio in your workshop! No handyman, hobbyist or mechanic can afford to be without this set of precision-made all hardened steel ball pein hammers. An amazing value—all 3 at better hardware stores—only 87c.

If your dealer cannot supply you, sent postage paid on receipt of \$1.00. Or sent C.O.D. postage and charges collect.

SET OF 3  
only **87c**

- THREE HANDY SIZES
- ALL HARDENED STEEL
- RUST PROOF PLATING
- FINELY BALANCED

Dealer Inquiries Invited

**C & L SCREW MACHINE PRODUCTS CO.**

Dept. A, 1651 W. Van Buren St., Chicago 12, Ill.





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#### A Quality Electric Drill Kit at a Big Savings

A wonderfully handy tool for light-duty, intermittent service in every shop. This sturdy  $\frac{1}{4}$ " drill comes complete with 14 popular size drills for wood, plastics, iron and steel. Dependable AC-DC motor operates efficiently at 1100 rpm. Has

self-lubricating oilite bearings; heavy chuck; built-in on-off switch and 7 foot cord and plug. Entire unit is balanced for easy, non-tiring work even in close quarters. For 115 volts AC-DC. An outstanding value. 46-027 (FOB Chicago) **ONLY \$15.95**

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City.....Zone.....State.....

can be raised or lowered without getting out of the car. The 40-horsepower Continental engine is in the front and most of the parts are standard. The car is designed for sports use or as a second car. Pilot models have been produced by machine-shop operation, but company officials hope for a production rate of 100,000 cars a year when they get their converted aircraft-engine plant into full swing.

Another good-looking sports car, known as the Rocket, is scheduled for production this year by the Hewson Pacific Corporation at Los Angeles. The car is a three-passenger single-seater and the buyer will have a choice of a four or six-cylinder rear engine. Design of the car is modern with no reverse curves, grilles, handles or protrusions. The "skin" is formed in 10 sections of aluminum sheet attached to hydraulically formed dural extrusions. Other features are a curved windshield of safety glass set in rubber, padded instrument board with all instruments grouped in a circular cluster in front of the driver, and an automatic transmission with hydraulic torque converter. Three tops for the car will be optional: a detachable metal top, a convertible fabric top, or a clear-plastic top for winter driving.

The International Motor Car Company at San Diego expects to be in production sometime this month with a two-cylinder two-seater called the Towne Shopper. This interesting new lightweight (600 lbs.) measures 116 inches over-all, has an engine mounted in the rear and is designed to sell for \$595. The usual engine space in front is converted into a package compartment. A unique engine feature is a fly-wheel that contains a generator and starter mounted in one unit, a fuel pump, and a pressure lubricating system. Aluminum construction is used almost entirely in the car aside from axles, bearings, springs, bumpers and steering column. Production is planned at the rate of 100 units a day.

Another light car—but still on the drawing boards—is the Kurtis-Kar which is being planned by Kurtis-Kraft of Glendale, Calif., builders of midget and Indianapolis race-car chassis and bodies. This auto is a three-passenger sports car with steel frame, aluminum skin and magnesium wheels. It will have a 96-inch wheelbase and a six-cylinder 80-horsepower engine in the front. The Kurtis-Kar will weigh 1500 pounds. The price will be in the \$2000 bracket, but customers who desire may purchase a complete set of knock-down parts and assemble the car themselves! The parts will be sold for about \$1000.

(Continued to page 264)



# Snap-on

## Armature Reconditioning Tool

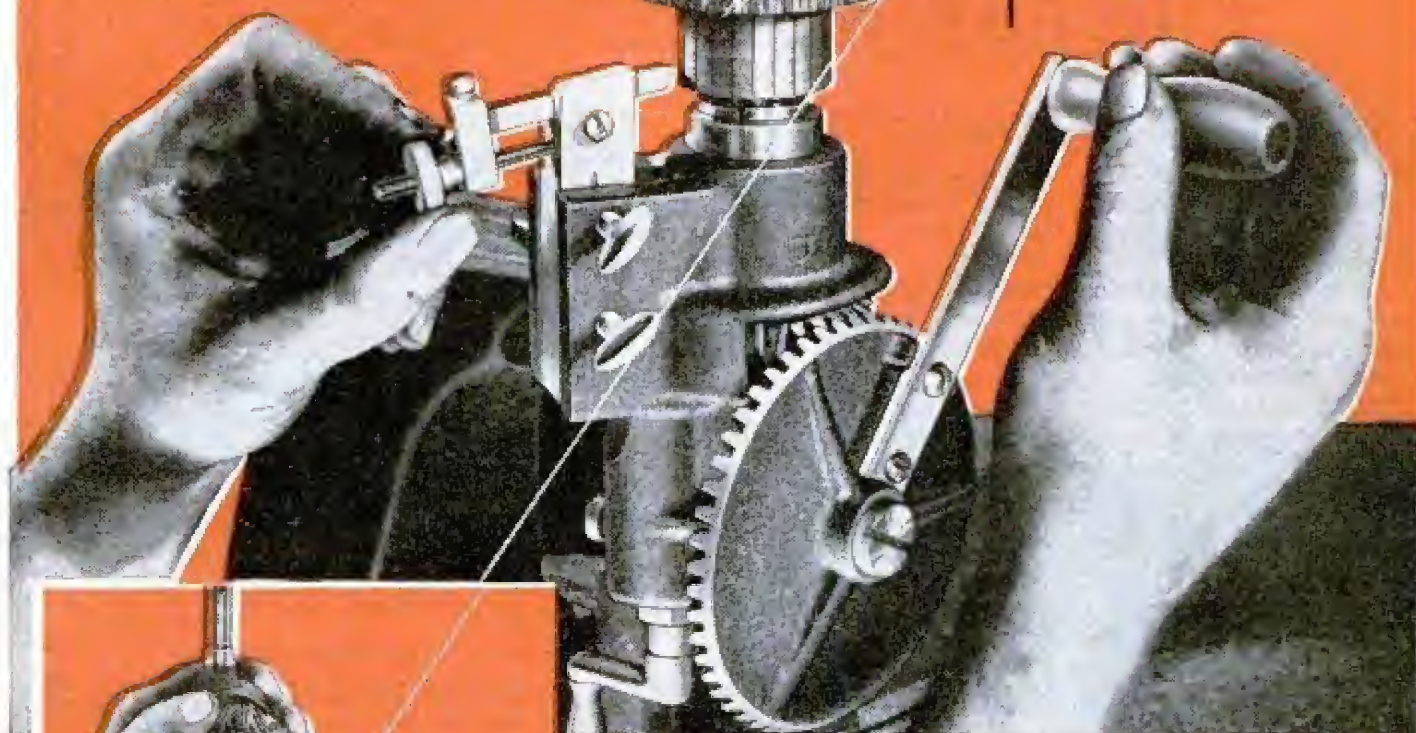
does both

1

TURNS DOWN  
ARMATURE

2

UNDERCUTS  
THE MICA



From start to finish, Snap-on Armature Reconditioning Tools are engineered to do an accurate turning and undercutting job. This unit requires no motor . . . no special centerless chuck. Simply lock it in a vise, insert armature shaft, and it's set to do an exact job, quickly, and with important savings in time and in capital investment, because it's faster to use than an ordinary lathe. The depth of the cut can be controlled to the finest shaving . . . the downward lead is fully automatic.

Undercutting the mica is just as simple . . . and when you finish the job by touching up the commutator with fine sand paper, the operation is completed to the entire satisfaction of even the most critical.

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THE CHOICE OF BETTER MECHANICS

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International Division: Kenosha, Wisconsin, U. S. A.





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**gets you there safely and economically**

The motor is in the rear, mounted low to aid balance and handling. No grease to rub off on your legs, no hot fumes blowing in your face. 100 miles per gallon, 30 MPH. 1½ HP fan cooled engine, kick starter, automatic clutch, fits any man's or woman's balloon-tire bike. See your dealer or write direct.  
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## BUTLER De-Scaler

Butler De-Scalers are available for use in home hot water systems, boilers, Diesel engines, etc.



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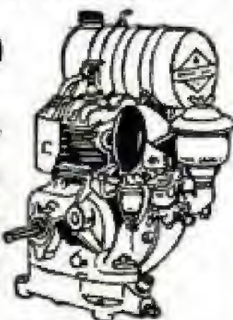
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Mill keyways, slots, splines, dovetails. Bore in reamers, taps, holes, and special cutters: produce spur, bevel, mitre and worn gears, ratchets and racks; mill flat surfaces, square shafts, mill hexes, spot face, drill spaced holes, bore, etc. on your lathe with this precision attachment. It has a T-slotted table, a vise which swivels for angular milling, a gear cutting fixture and dividing centers.

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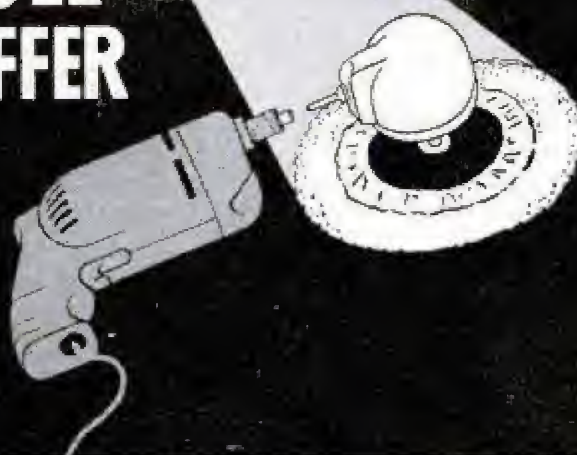


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The very first time you polish your car, sand your own floors, refinish furniture, this tool has more than paid for itself. And what a kick you'll get out of doing all the polishing and sanding jobs that used to cost lots of money! With the Bull Buffer, you can do beautiful, professional work—make your car, furniture, floors, woodwork gleam like new. You'll find no limit to the ways Bull Buffer will save time and money in your home and business.

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**JUST OUT!** Gov't surplus used on Army tanks. These telescopic rustproof antennas have tremendous pickup eliminate dangerous wiring. Solid Brass throughout practically insuring **NOISE FREE RECEPTION.**

**Exceptionally Rugged Sections** compress into 1 ft. 3 in. Handy for Camping Trips, also Useful for Transmitting, FM & Television sets. Each antenna comes securely packed with mounting bracket. Easy to install anywhere.

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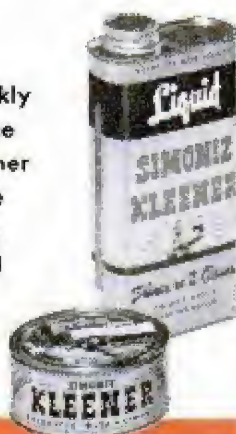


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Simoniz "builds up" your car's beauty—  
makes the finish brighter with each  
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works miracles in restoring the  
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Simoniz to make that restored  
beauty last years longer.

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Motorists Wise Use

# SIMONIZ

KEEPS ALL CARS NEW LOOKING

Also available to American buyers of small cars this year are four new models of the British Austin.

Will the so-called boom of the light-car manufacturers go down in history as a fad following World War II, or is it here to stay? This is what Powel Crosley, Jr., leading figure of the industry, has to say:

"The lightweight car is the result of years of study as to how to put automotive transportation back into the hands of budget-conscious American families. The small car has long been popular abroad, where gasoline always has been expensive. Its low initial cost, economical upkeep and maneuverability in the narrow streets of ancient cities account for that. In voluminous correspondence from owners of our cars in every walk of life we learn that they favor the small car because (1) the first cost is reasonable; (2) upkeep is inexpensive and budgetable; (3) maneuverability is simple and energy-saving; (4) general utility features make such a car highly serviceable; and (5) the price permits low-cost financing and a rate of payment within the means of any income group.

"The flow of mail from doctors, lawyers, tradesmen, housewives, new drivers, veterans and satisfied customers from coast to coast is steady, unsolicited and extremely gratifying. We feel it is worth all we have done to put economical automobiles within reach of average American families who must eat, live and travel on a modest income. Besides this vast field, the lightweight car will always find acceptance where people can afford a second car. The factors cited here, and a long view of the nation's economy have convinced me that the future of the light car is assured."

## We're Racing a Power Shortage

(Continued from page 93)

In a hydro system the mechanical power would be derived from a shaft connected to the water wheels instead of to a turbine.

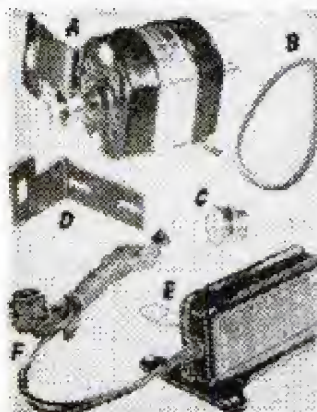
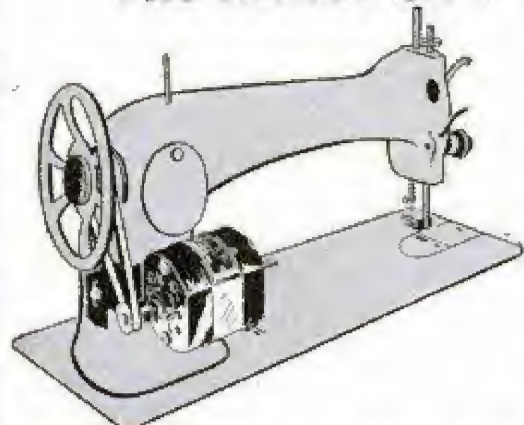
We now have 60-cycle alternating current at 11,000 volts pressure, suitable for transmission over short distances. For longer distances it will be increased to 66,000—or even higher voltage—by means of a transformer. In essence, a transformer consists of an inverted iron U, submerged in oil for insulation and to reduce heat, with the incoming and outgoing legs wrapped with copper wire. To raise the voltage six times, there are six times as many turns around the outgoing side as around the incoming side.

A large industrial customer may take  
(Continued to page 268)



# ELECTRIFY

Your Sewing Machine With a  
**"SEWING MACHINE MOTOR KIT"**  
 The IDEAL GIFT for Mother... Wife... Sister!



**\$17.75**  
 COMPLETE

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**ANYBODY CAN INSTALL IT!**

Takes but a few seconds

COMPLETE SET CONSISTS OF:  
 (A) MOTOR & BRACKET—Universal AC or DC, 60  
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 CONTROL—7 Step Rheostat. (F) CORD SET—Exten-  
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SPECIAL NOTE: This 1/20-H.P. motor with double  
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☐ send C.O.D.—and I'll pay  
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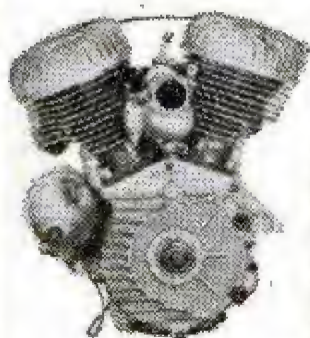
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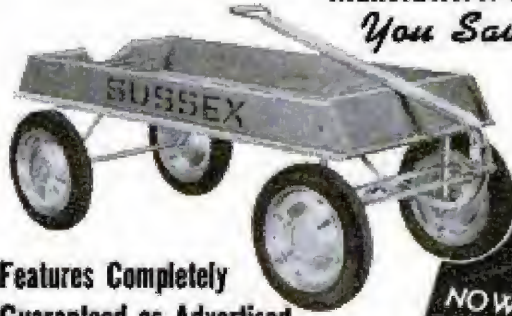
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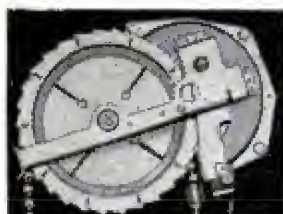
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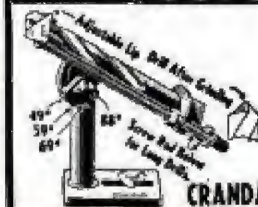
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Paints walls, ceilings, screens, furniture and machinery faster, better. All complete as shown less motor. Carry anywhere. Fully guaranteed. Could be used with 1/4 H.P. motor or less. Price \$35.00 less motor F.O.B. Chicago. \$5.00 deposit balance C.O.D. or see your dealer. With motor \$55.00.

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ABRASIVE CLOTH  
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**\$10.00 Value... NOW ONLY \$1.98**

Big bargain package of abrasive cloth! Contains 10 rolls (average length 73") from 1" to 4 1/4" wide. Grits range from #40 to #600. Each roll is different width and grit. Every roll top quality from such makers as Carborundum Co., Minnesota Mining & Mfg., and Behr-Manning. Assortment easily worth over \$10.00! Perfect for handymen, mechanics and home craftsmen. Supply limited — order today!

**SEND NO MONEY!** Just send your name and address. When assortment arrives pay postman \$1.98 plus a few cents postage or send cash and we pay postage. Inspect for 10 days. If not delighted return for full refund.

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**DUAL INTAKE MANIFOLDS for V-8 FORDS AND MERCURYS**

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Chrome Plated Velocity Stocks — \$1.50 ea.  
By Test: Increased Acceleration by 26%  
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How to Open Locks without Keys or Picks: Secret of Locksmithing! How to Make Keys by the Impression Method: Master Key Systems.

**TOTAL COST ..... \$190.00**  
This \$77.75 cost of the Key Blanks would return to you \$490.00 or more. This would more than pay for your entire KEY MACHINE OUTFIT.

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Many small parts can be formed without dies, to duplicated accuracy of .001" with DI-ACRO Precision Machines. — Benders, Brakes, Shears. Save die expense and time delay. Ideal for experimental and research work, making samples, models, etc., as well as regular production runs. Write for descriptive literature.

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**A Big Pay Business**—and it's all yours! It's so easy to start your own job welding shop and reap the big dividends that Hobart Arc Welders bring you. There's plenty of arc welding repair and construction work everywhere, customers even bring it to you.

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**HOBART Jr. Electric 150 Ampers Welder**



The HOBART A. C. Welder for single phase lines

**The HOBART SCHOOL of ARC WELDING** — It's a modern trade school in which students learn by doing. Expert instructors give individual attention. Each student has own welding booth and welder. Fully accredited under G. I. Bill of Rights. Send coupon.

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BOX M-48, TROY, OHIO. "One of the World's Largest Builders of Arc Welders"

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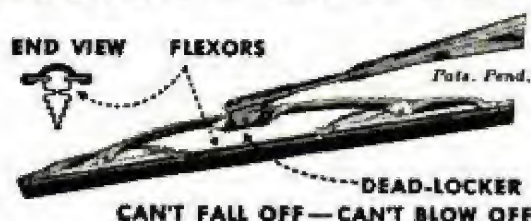
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**Free!** Arc Welder's Vest Pocket Guide contains tables, equations, charts, etc.

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TRY THIS AMAZING NEW  
**ANCO® CLEAR-FLEX**  
Trade Mark  
**WINDSHIELD WIPER BLADE**



**FLEXES TO CLEAR THE LOW SPOTS**

Know CLEAR-FLEX . . . the first Wiper Blade to conform fully to all windshield surface irregularities. Even wipes uniformly all types of curved windshields. Keeps clear those annoying hard-to-reach low spots common to all FLAT windshield glass. Clears quickly blinding road muck . . . slapped against your windshield from sloppy pavements . . . by passing cars. CLEAR-FLEX already has engineering approval for original equipment on coming models of high-grade cars.

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Deposit with your dealer only the regular retail price. Use CLEAR-FLEX through the next storm. Then IF you are willing, dealer is authorized to remove CLEAR-FLEX and refund all your money.

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**WIPER ARM**

ANCO Arm fits quickly any wiper shaft. Suits any good wiper motor. Holds Blade true . . . at correct pressure. If not now on your car, ask serviceman to install a PAIR quickly for you. More than 250,000 good gas stations and service stores sell ANCO BETTER Blades and Arms.

Made by the makers of long-famous ANCO RAIN-MASTER® Blades and Arms . . . original equipment for years on DeLuxe models of high-grade cars. Your dealer knows ANCO.

*Get yours next time you buy gas.  
 May save you a costly smashup.*

Quality Protected Under Fair Trade Laws  
 ANCO Patented Products—Patents Make Jobs

**THE ANDERSON COMPANY**  
 Established 1918  
 GARY, INDIANA

power off the line at this high voltage or after it has been reduced to 22,000 at a transmission substation, by reversing the process which increased it. It is subsequently reduced to 4000 volts and is finally knocked down to 115/230 before entering a home or store.

We have seen that the power demand is 17 percent higher than the wartime peak, but when one attempts to translate this situation into concrete terms of "power shortage" or "no power shortage" he finds himself in the middle of an argument.

On the one hand we have the Edison Electric Institute, whose members include practically all the large privately operated utilities producing 70 to 75 percent of the power generated in the nation. It announced at the end of last year that "telegraphic reports from power systems throughout the nation show that the greatest electric power demand in history was successfully met by the electric light and power industry this December, the period of greatest use of electricity. This accomplishment confutes 'dope stories' of an impending power famine, current last summer and fall, and the recent 'power shortage' report of REA Administrator Claude Wickard."

Mr. Wickard, as head of the Rural Electrification Administration, is vitally interested in available power, since his agency loans money to cooperative groups to install distribution systems and bring the blessings of alternating current to those who haven't enjoyed it.

The EEI declares that the power industry got through the month of December—crucial because of less daylight, Christmas shopping and peak industrial production—with a reserve capacity of five percent and concludes that there is no shortage.

"The power people have tended to minimize the shortage right along," Mr. Wickard states. "And, in addition to this, they seem to be unaware of how rapidly America wants to grow. Reserve capacities of five and eight percent may mean that no one will have his service cut off—if we're lucky—but it does mean that we all have our heads pressed against the ceiling, that we lack the capacity to serve new industries and meet the increased demands of residential users."


Critics of the power industry have one adherent in the person of the president of a southern utility, who recently declared, "There is a very serious shortage of electric power and energy all over the United States."

While it is unquestionably true that few

(Continued to page 272)



**The CLINTON Gas Engine**  
**2 H.P.—\$59.50**  
**3 H.P.—\$74.75**



● Complete, compact, dependable, 4 cycle, single cylinder, air cooled gasoline engines—by world's largest producer of 2 H.P. gas engines. Ideal for power tools, saws, farm machinery, pumps, boats, bikes, etc. A penny postcard brings you full information. **Immediate Delivery**

**SPECIAL MODELS:** Kick starter • Thrust bearing type  
 Gear reduction • Marine type

**FREE:** Literature describing all uses. Write today.  
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**\$2.98**  
 less bat. (6-volt)

Maybe tonight's the night you'll need a good electric lantern. Here it is! Has dozens of uses, indoors and out. Shoots 800 foot beam. Light "stays put" at any angle you set. Buy at hdw., sport, or electrical stores.

**Delta REDDYLite**  
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**GATEWAY Catalog 1948**

**NEW FREE FISHING TACKLE Catalog**


**GATEWAY SPORTING GOODS CO.**  
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**SAY YOU SAW IT IN POPULAR MECHANICS**

**5,000,000 FEET OF LUMBER @ \$35 per M.B.M.**

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**811-B BELSAW MACHINERY CO.**  
 315 Westport Road, Kansas City, Missouri



Send For FREE Book

**FLASH THAT VOLTAGE**



Turn that knob. Extinguish the neon glow. Instantly read voltage right off dial. MINI-VOLT measures 65 to 660 V. AC. Also DC. Tells whether AC or DC. Virtually burnout-proof. Guaranteed for 10,000 hours' operation. Bakelite case. 12" flexible test leads and test probe. A "must" in electrical and radio work. Only \$2.50 postpaid!

**INDUSTRIAL DEVICES, INC., EDGEWATER 1, N. J.**

**If you love fine tools,  
 we dare you  
 to look at this drill**

YOU CAN'T GO to your hardware store, see this new Millers Falls tool, heft it, grip its smooth, warm handle, spin its drive gear . . . and come away without wanting it for your own!

This is the new Millers Falls No. 104 Hand Drill . . . and if you know Millers Falls Company at all, you know it *must* be right. We don't take tools lightly. A new tool has to be *right* — in performance, in durability, in value — or it has no place in our line.

This new tool is *right*. Long planned and released now to celebrate the company's eighty years of toolmaking, it's the finest hand drill we've ever made.

See it — if you dare — at your hardware store. Millers Falls Company, Greenfield, Mass.

**80th ANNIVERSARY**  
**1/4" HAND DRILL**  
**NO. 104**  
 Complete with 8 drill points **\$5.00**  
*Slightly higher in the West*

NO MERE DIE-CAST GEARS but machine-cut; cast iron drive gear meshes smoothly with steel pinion to deliver trouble-free performance year after year.

EASY-GRIP HANDLE of tough, durable plastic. Contains 8 drill points; long enough to hold standard twist drills.

**Millers Falls Tools**

**Celebrating 80 Years of Toolmaking**

**"OILITE" SPINDLE BEARING** with ball thrust.

**NEW TRUE-RUNNING 1/4" CHUCK;** 3 hardened jaws.





**INSERT MOLLY**

**TURN SCREW**

**FULLY INSTALLED**

**REMOVE SCREW**

**PLACE FIXTURE**

**FIXTURE MOUNTED**

**WITH MOLLY YOU CAN FASTEN ANYTHING**  
and do it quickly, neatly and safely. MOLLY will hold fixtures securely to floors, ceilings or any hollow wall construction... Simple to install, all you need is a screw driver. Sold by leading hardware stores everywhere.

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SCREW ANCHORS

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FOUR CYLINDER  
PORTABLE AIR COMPRESSOR  
SPRAY PAINTING OUTFIT



**\$99<sup>95</sup>**  
COMPLETE

COMPACT • RUGGED • POWERFUL

The ideal air supply for home and farm workshop, machine shop, garage, service station and contracting painter. Inflates tires; refinishes automobiles, trucks, implements and furniture. Paints buildings better, faster and at lower cost than brush work. Compressor has 4 cylinders, drop forged crankshaft, heat treated valves and pistons, bronze bearings, forced feed lubrication, 50-60 lbs. pressure without pulsation. Price includes compressor as shown, with air gauge, 15 ft. hose, spray gun and  $\frac{3}{8}$  h.p. motor; fully guaranteed. With  $\frac{3}{4}$  h.p. motor—\$109.95.

IF YOUR DEALER DOES NOT SELL  
PRESSURE QUEEN WRITE DIRECT.

**THE CAMPBELL-HAUSFELD CO.**

1046 RAILROAD AVE.

HARRISON, OHIO

**\$2<sup>95</sup>**

## TORNADO GAS TORCH

**The Modern Way of Soldering**

Ideal for hard and soft soldering. Will heat quickly; solder will flow freely and smoothly. No compressed air required. Self-adjusting. Safe. Economical. Can be used for annealing small parts and bending metal parts. Generates a heat of 1700° F. Simply connect to any illuminating gas jet with a rubber hose and operate. Tornado Torch No. 119 comes with three tips, ( $\frac{1}{8}$ ",  $\frac{1}{4}$ ",  $\frac{3}{8}$ " blast).

Tornado Gas Torch No. 119—Complete with 2 tips, for Natural Gas or Bottled Gas; with 3 tips for Manufactured Gas. \$2.95 per set. See your dealer or order direct. Send check or money order—post paid.

Robco Corporation, 202 E. 44th Street, New York 17, N. Y.

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**Build Your Own Trailer with NATIONAL'S Simplified Plans**

Beat the housing shortage with a full-size house on wheels or add new pleasure to your vacations and week-ends with a sleek sport trailer. Step-by-step instructions and complete bill of materials with every plan. *Three different models.*

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**ORDER ALL THREE—AND GET ONE FREE**  
Complete set \$2.00

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FREE with any order!

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Dept. 51 • Box 2353 Terminal Annex • Los Angeles 54, Calif.

**Patent Pending**

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**TONGUE AND GROOVE - FLUTING - NOTCHING - INLAY - ANY JOINT**

# Aladdin's Tool

**AND YOUR DRILL PRESS**

Makes any cut wood-shaping tools costing up to \$300.00 can make—more too. Sturdily built, lasts a lifetime.

**TWO MODELS—IMMEDIATE DELIVERY**

DeLux Model includes bottom bearing that anchors tool to bottom of press. Regular Model without bearing. Comes complete with adaptor and 6 blades making 12 standard cuts—balance blade—beautiful wood box. Over 100 different, practical cuts can be made with the 6 blades. See your dealer or send check or money order for delivery to your door. All other orders C.O.D. plus postage.

**THE DESIGN COMPANY**  
2603 Warwick, Dept. A19, Kansas City 8, Mo.

**DELUXE MODEL**  
**\$11<sup>95</sup>** with bottom bearing as illustrated

**REGULAR MODEL**  
without bottom bearing .. **\$7<sup>95</sup>**



## CONVERT HAND MOWERS TO POWER MOWERS

**Takes Less than 3 hours**

The Handy-Dandy Lawn Mower Kit fits any hand mower from the 16 to the 20 inch size. Complete with all necessary parts. Kits can be purchased separately or complete with power units.

**DEALERS WANTED**

**LE CLAIRE MFG. CO., Le Claire, Iowa**

Mfgs. of the Handy-Dandy Aluminum Clothes Pole



Maytag Kit  
Completely  
Assembled

## LIFETIME BRONZE ANCHOR FOR FISHING & HUNTING BOATS

Non-rusting, non-corrosive . . . single cast assembly . . . "nothing to come apart."

Weight: 9 lbs.  
Arms: 9 1/2" (length)  
Flukes: 2 3/8"  
Over-all length: 17"  
Swivel shank in 6 1/2"  
self-cleaning housing. Will  
not foul ropes.

**\$3.50**  
FOB  
IMMEDIATE  
DELIVERY

**CALDWELL & WARD BRASS CO.**  
SYRACUSE, NEW YORK



## Thompson BEATS the World on BOATS



**Better Built  
Lower Prices**



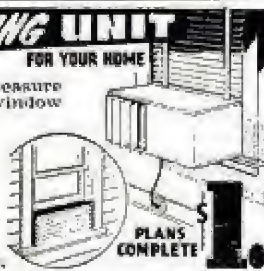
**Safe Boats With  
Full Length Spray Rails**  
Keep passengers perfectly  
dry—even at high speeds.  
Catalog also shows two new  
models of "Take-Along"  
Boats. Two big factories—  
save you freight.

**CATALOG FREE**  
Write for your copy. State kind of  
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We show you how. It's easy to build and a pleasure to use. An individual unit that fits your window and really cools the room. Up to 18° cooler than outside. Sleepless nights vanish with a cool bedroom. Real Air-Conditioning, not just a fan. Different sizes to fit any room. No expert knowledge needed. Mail \$1 now for complete simplified PLANS and valuable Catalog.

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## HUNTING KNIFE

**MADE FOR U. S. MARINE CORPS**  
USED BY HUNTERS — FISHERMEN — CAMPERS  
7 1/2" Single Edge Blade — 12" Overall Length  
Dressed Leather Handle Saddle Leather Sheath  
**A \$4.00 Value — Send \$1.25**  
No C.O.D. We Pay Postage

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APRIL 1948

## in Basic Improvements



Now, AC introduces, for automotive service, insulators made of the *patented* wide Heat Range aluminum oxide material, which was used exclusively in aircraft plugs for American planes during World War II. AC has consistently been *first* in basic spark plug improvements—pioneering such revolutionary advancements as the one-piece plug—the welded side electrode—the unglazed insulator tip—the complete Heat Range of plugs in every thread size—and *now* the patented aluminum oxide insulator.

That's why AC Spark Plugs are tops in performance—why you should choose them for utmost reliability.

**AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION**

SAY YOU SAW IT IN POPULAR MECHANICS



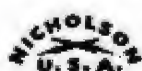


**IT'S BACK!**—the Handy File which won the favor of tens of thousands of users before the war temporarily halted its manufacture. Now again craftsmen and home owners can enjoy the convenience and economy of its features, which include two kinds of cutting surfaces:

**Single cut** teeth on one side, for sharpening edged tools and smooth finishing in general. **Double cut** teeth on the other side, for fast stock removal.

In addition, the Handy File has one cutting and one "safe" uncut edge. Flat, orange-colored handle makes the Handy File easy to carry (no bulge—slips conveniently into hip or leg pocket). Also has convenient hang-up hole.

The Handy File (in either Nicholson or Black Diamond brand) is virtually two files in one. Get it at your hardware dealer's. Each Handy File is cellophane wrapped, to bring it to you fresh and free from rust.



**NICHOLSON FILE CO.**  
22 Acorn St.  
Providence 1, R. I.



(In Canada, Port Hope, Ont.)

**NICHOLSON**  
**FILES** FOR EVERY PURPOSE

home users had to go to bed in the dark or that there has been little real industrial dislocation, there are enough recorded instances to indicate that all is not well:

In Maine, customers of one utility were divided into three groups and each group received power only one hour out of every three. A farm bureau, the potato growers association and 12 chambers of commerce declared that the power shortage "wreaked such havoc and cost the county so much money that (the utility) rates should be reduced rather than increased."

Two Florida plants producing phosphate were forced to curtail operations because they were deprived of power. This, however, was interruptible power, bought at a low rate with the understanding that it might be cut off at the utility's discretion.

Residents of Minneapolis and persons living between La Crosse, Wis., and Sioux Falls, S. D., were asked to cut their use of power between the hours of 4 and 6 p.m.

In many states consumers were asked to reduce over-all consumption and particularly at peak hours; the use of electric hot-water heaters was discouraged; industry was asked to voluntarily shift heavy loads to off-peak hours. Many systems reduced voltage at peak hours to spread out the supply of power.

National demand is at its present high level because of heavy production of all types of goods, a high national income which permits the individual to use all the current he wants and to buy appliances which increase the load.

Consumption, prewar, increased about 10 percent a year; since 1945 every year has more than doubled the 1939 figure. In 1947 the average family used 1400 kilowatt hours, as compared to the prewar average of 950. In one week last December, we used more than 5.3 billion kilowatt hours; in the same week of 1940 we used only three billion.

That the power industry is trying to keep abreast and forge ahead of this demand is quite clear. Its current construction program calls for installation of 15 million kilowatts of capacity in the five years from 1947 to 1952 at a total cost of from five to six billion dollars. The magnitude of this program can be appreciated by pointing out that this represents 37 percent as much installed capacity as the industry achieved in the previous 65 years. This year utility companies expect to install enough equipment not only to keep up with the increased demand but to exceed it by two million kilowatts. This would add a little slack to the reserves.

(Continued to page 276)



# Revolutionary New

# Dumore Carvit

makes you a skilled wood-carver in 20 minutes!



Here's a fascinating new hobby—complete in one tool. The unbelievable perfection of your first carving amazes your friends! Experienced craftsmen use the Carvit to give their woodworking projects

that professional touch. With the Carvit, you make beautiful replicas of inexpensive objects you can find in any dime store or gift shop—in mahogany, walnut, and other fine woods.

**You're an expert at once — with a Carvit!**

Here's how the easy-to-use Carvit works: You clamp a model to the table below the tracer, and a wood block below the cutter. Then you switch on the motor and guide the tracer over the raised contours of your model. The cutter moves with the tracer to carve an exact duplicate of the model. With an index

attachment, you can carve objects in the round—statuettes, busts, etc.

Carving with the Carvit is fascinating fun for everyone. The Carvit is the ideal gift for your sweetheart, husband, or son! See this exciting new tool at your local hardware store today — or mail us the coupon below!

Satisfaction guaranteed or your money back in 10 days!

No skill or training needed to do work like this



Carve useful ornaments for the home — distinctive gifts for friends — fine carvings that sell!

**Tear out coupon and mail today!**

The Dumore Company, Dept. D-51 Racine, Wisconsin

- ☐ Please send complete information on the Carvit.
- ☐ Please send one Carvit, \$48.50 enclosed.
- ☐ Please send one Carvit with index attachment, \$58.25 enclosed. Shipping charges C.O.D.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

H-5

**SOUTH BEND**

## LATHE COLLETS

Precision Steel and Brass Collets for use in any make of lathe or other machine that they will fit.

### SPECIFICATIONS

Collet No.	Thread Dia. in.	Thread Length in.	Th's Per In.	Body Dia. in.	Collet Length in.	Head Dia. in.	Head Taper Deg.
3	.650	3/4	26	.6495	2-11/16	.852	12
2	.855	13/16	20	.8595	3-5/16	1.095	15
5	1.250	3/4	20	1.2495	3-9/32	1.452	10
4	.950	13/16	20	.9495	3	1.150	10

	No. 3	No. 2	No. 5	No. 4
STEEL COLLET	\$3.75	\$4.00	\$4.75	\$4.25
BRASS COLLET	2.00	2.25	2.50	2.35

**SOUTH BEND LATHE WORKS** 455A E. Madison St. South Bend 22, Ind.

# RA-TOX

WOOD SPLIT Ventilating SHADES

for INDUSTRIAL WINDOWS

RA-TOX wood-splint Shades provide protection from direct sun-rays and reflections; they produce a soft, restful illumination that protects your employees from "Eye Strain" and "Glare Fatigue."

RA-TOX Shades are good looking, easy to roll up or down quickly, adjust to changing daylight conditions. Made to your measurements, of basswood splints interwoven with special strong seine-twine . . . heavy duty cord-lock holds shade at any height. Sturdy installation brackets. Up to 15 or 20 year service with ordinary care.

Write for latest Folder.

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(Industrial Division)

1107 Jackson St., Janesville, Wis.



**LIGHT WITHOUT GLARE! AIR WITHOUT DRAFT!**

Made in sizes and types to fit every style of industrial window either steel or wood sash. A nation-wide shading service. There is a RA-TOX representative in your area.



"The gun that looks and feels like a laser"

## HY-SCORE

**World's Most Powerful AIR PISTOL**

ACCURATE! FAST! HARD-HITTING . . . Expensively made piston-type pistol for use by experts. No pumping. 30 1/2 oz. 10 1/4" long. Cal .177 or .22. \$19.85 for set including Hy-Score Pellets and darts\*. Extra ammunition per box of 500 rounds. \$1.49 for cal .177, \$1.88 for cal .22.

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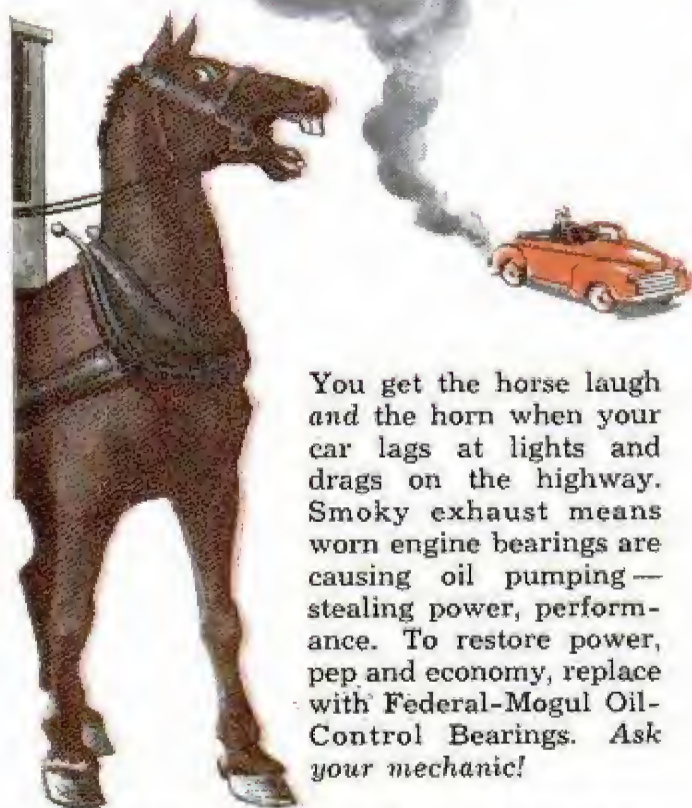
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**HY-SCORE ARMS CORP., BROOKLYN 1, N. Y.**

Use HY-SCORE Pellets for best air pistol shooting.



YOU GET THE "HORSE LAUGH" WHEN

PERFORMANCE  
GOES UP  
IN SMOKE



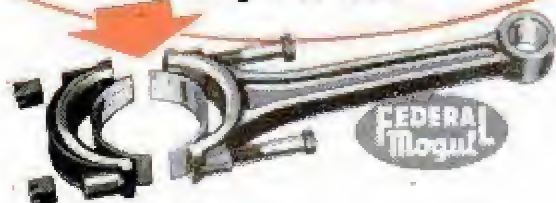
You get the horse laugh and the horn when your car lags at lights and drags on the highway. Smoky exhaust means worn engine bearings are causing oil pumping—stealing power, performance. To restore power, pep and economy, replace with Federal-Mogul Oil-Control Bearings. Ask your mechanic!

FEDERAL-MOGUL SERVICE  
DIVISION OF FEDERAL-MOGUL CORPORATION  
COLDWATER, MICHIGAN

Replace in Sets with Genuine

**FEDERAL-MOGUL**

Oil-Control Bearings  
in your car



## STEEL TUBING KIT



\$2.50  
POST PAID IN U.S.A.

**For Home Craftsmen**  
NOW YOU CAN MAKE, REPAIR  
LAMPS BUSHINGS HANDLES  
JEWELRY NOZZLES SPRAYERS  
TOOLS SHAFTS TOYS  
HUNDREDS OF OTHER USES

12" Lengths  
Longer lengths  
on request.

8 Sizes  
3/8" to 1 1/4" O.D.  
Graduated in 1/8"

Precision-made, electric-welded tubing, 18-gauge, low-carbon, cold rolled steel. Free machining, bends, forms, rolls, beads, plates easily. Protected against rust.

SEND CASH OR MONEY ORDER

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USE THE  
WIND TO  
CHARGE  
BATTERIES



## 6 VOLT WIND DRIVEN GENERATOR

Ideal for farm and camp lighting—for boats, motorcycles, autos, farm radios, etc. The wind driving the propeller operates the generator. Produces 6 volts, 12 amperes—weighs only 8 1/2 lbs.

OPERATE WITH PROPELLER OR PULLEY

May be used with 13 inch propeller as illustrated—with homemade propeller or pulley. For farm lighting plants using batteries it may be run direct by windmill. Use pulley for autos, boats, etc. Fitted with break to control charging rate. With 13 inch propeller as shown, each \$22.95. Generator only, less propeller \$14.95. Shp. wgt. approx. 12 lbs. F.O.B. Houston. Send check or money order. Immediate shipment.

AERO PARTS SUPPLY

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## AUTO ENGINE SPEED CONTROL GOVERNORS



In Montreal, 7546 Wine-  
man; in Skaneateles, N. Y.,  
Horle Welding Supply.

Agents Wanted

CANDEE-SMITH GOVERNORS  
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## FISH POLE or SKI CARRIERS



A "must" for Sportsmen! Genuine rubber suction cups for fenders or car top. Rigid, safe carrier for fish poles, skis, etc. \$1.50 per set delivered post-paid cash with order. No Stamps.

\$1.50 PER SET  
THOMPSON ENGINEERING CO.  
DEPT. 70 GRAND RAPIDS, MICH.

## Air Corps Type SUN GLASSES



Brand New. Protect your eyes in style with this attractive sun glass. Ground and polished processed lenses. Approved by the Government Bureau of Standards. These glasses absorb over 96% of the ultra-violet and infra-red rays. 24 K gold plated frames with pearl Swart Bar. Comes in individual case. \$8.00 value for only \$3.45

Also available in ladies styles.

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Electrically Welded Endless

*Paramount*

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SAW  
BLADES**



Made in widths from 1/8" to 1-3/4"

Make your band saw do more work for you. The proper width of blade will extend the scope of this important machine. Burrill's Paramount Blades are made from tough Nickel Alloy Steel properly tempered. Teeth accurately set and filed, and all saws carefully straightened. Send order and check today. Delivery will be made as promptly as conditions permit, from a few days to a week or two. You can obtain these saws at the following prices:

1/8"-3/16"-1/4"-3/8" wide, 5'6" long.....\$1.04 each  
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Other sizes at proportional prices

**NO C.O.D. SHIPMENTS ACCEPTED**

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Your satisfaction is guaranteed

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**NEW! BETTER!**  
**AIR-COOLED CARBURETOR  
INTAKE STACK!** FOR 25 1/2" CARBURETORS

Soup-up performance!  
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Newest model self-drive, three-wheel, rotary blade mower. Equipped with quick-starting, dependable, trouble-free 1 1/2-2 h.p. Clinton engine. Light. Sturdy. Choose from three models of assembled mowers or Build-it-yourself kit of parts. Guaranteed.

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OF ALL TYPES—10c UP  
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shaves and  
more of 'em**

**STROP YOUR RAZOR  
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RAZOR, STROP  
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5 VALET BLADES

**\$1.25**

**NEW VALET  
Auto-Strop  
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**STROPS—CLEANS  
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The Sensational NEW  
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**FASTER—SMOOTHER—EASIER SKATING**

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YOU will like the NEW "JET" Roller Skate... Study the THREE-IN-LINE-ROLLERS... Goes over cracks and irregular surfaces with a new smoothness... The "JET" Skate is the ONLY SKATE WITH BRAKES to STOP QUICK. Another feature: you can quickly change to Ice Skates by replacing the rollers with the "JET" Ice Skate Attachment... A new experience awaits you in Roller Skating... Get a pair TODAY... Three Sizes: Large, Small, and Medium for CHILDREN and ADULTS... In ordering simply GIVE SIZE OF SHOE.

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**• ICE SKATERS  
ROLLER SKATES**

**50% Lighter Than  
Ordinary Skates**

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Be  
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Only **\$4.95**  
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\$2.25 Extra

3 Ball Bearing Wheels  
in line gives  
MORE SPEED with  
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Note the BRAKE!  
to STOP QUICK  
simply RAISE THE TOE

• We Ship C. O. D.  
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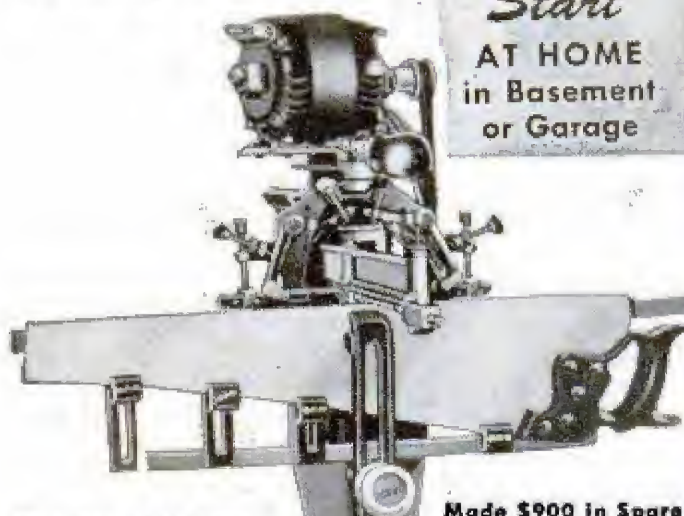
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# CASH

FOR YOUR SPARE TIME

**MACHINE  
SAW FILING  
PAYS UP TO  
\$2 or \$3 an Hour**



#### Filed Over 5,000 Saws

"I have used your Foley Automatic Saw Filer for over eight years and find it very satisfactory. To this date I have filed over 5,000 saws." A.G.W., Mass.

#### Made \$900 in Spare Time

"I did very well last year with my Foley equipment, about 950 saws and 240 lawnmowers, in my spare time. About \$900 for me." L. H. M., New York.

#### MAKE OLD SAWS CUT LIKE NEW

"The first saw I sharpened came out 100%. I have been filing saws for 15 years by hand, and my Foley Filer showed me that I didn't know a thing about filing saws"—writes C.E.P., Penn. H.S.W., Iowa says—"Didn't think there were so many saws in my whole territory. I am working all day and late at night trying to keep ahead of the rush."

With a Foley Saw Filer you can file all hand saws, also band and cross-cut circular saws. It is easy to operate—simple adjustments—no eyestrain. Patented jointing principle evens up all irregular teeth and makes an old saw cut just like new.

#### FREE PLAN SHOWS HOW TO START

No canvassing necessary—"I advertised in our local paper and got in 93 saws—I only work spare time at present" says M.L.T., Ohio. You can get IMMEDIATE DELIVERY on a Foley Saw Filer. Send coupon today—no obligation.

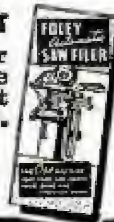
**FOR A STEADY REPEAT CASH BUSINESS GET A**

### FOLEY Automatic SAW FILER

FOLEY MFG. CO., 416-8 Foley Bldg., Minneapolis 18, Minn.  
Send Free Plan on Saw Filing business, no obligation.

Name.....

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The electrical manufacturing industry, loaded with orders right after war's end, has met the challenge head-on and is now producing steam and hydro facilities at a rate never before contemplated and the leading companies in the field are said to be capable of turning out 4½ million kilowatts of capacity a year.

Westinghouse hit its stride last July and has since been turning out steam-turbine generating equipment at double the previous highest rate and expects to continue this pace through 1950. Switchgear and distribution transformers are running off its lines twice as fast as in 1941.

General Electric, the world's largest producer, expects to deliver 9½ million kilowatts of steam-turbine capacity in the next four years and one million kilowatts of hydro capacity in the next two years. In 1947 GE turned out 50 percent more steam turbines than in 1940, both in numbers and capacity.

Nor is the industry resting on its oars as far as developing new techniques to increase efficiency is concerned.

Transmission of electricity under the heaviest pressure in history—500,000 volts—is being conducted experimentally at Brilliant, Ohio, in an effort to learn techniques which will permit sending more electricity farther and more economically than has ever been accomplished. Success in these experiments will mean that greater interchange of power between systems will permit a reduction in the number of generators inter-connected systems must keep in reserve, and will provide greater operating economies than are possible at present.

This outdoor laboratory includes three test lines, two of which are 1½ miles long and the third 800 feet. Power received from a nearby station of the Ohio Power Company is raised by three giant transformers from 264,500 volts to a maximum of 500,000 volts in 24 steps. Until these tests were inaugurated, the highest voltage at which electricity had been transmitted in this country was 287,000 volts, on the 265-mile line from Hoover Dam to Los Angeles. However, in Sweden pressures of 345,000 volts have been successfully handled.

One of the major problems to be solved is that of corona, which is the loss of power from the lines or conductors into the air when the power is under heavy pressure. The obvious solution—using extremely large transmission cables—would make the line too heavy to withstand wind and ice loading and would boost the cost of such an installation to a prohibitive point.

(Continued to page 280)



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Make this light, tough,  
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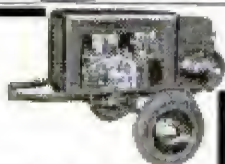
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Just order the Smith Compressor Head and  
Accessories with complete instructions for as-  
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to 100 lbs. per square inch. Head equipped  
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WRITE **GORDON SMITH & CO., Inc.**  
TODAY! 410 College Street Bowling Green, Ky.



#### MOTOR ARBOR AND COMBINATION V-PULLEY

1/2" right, .65c 1/2" left, .75c  
5/8 & 3/4 R & left, ..... \$1.00  
Add 10c postage each, U.S.A. Trade disc.

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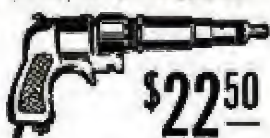
## THIS MOTOR

1/30 HP 24 volt DC motor  
2450 R.P.M. .95 amps 1/4"  
shaft size overall 3" x 4".  
Weight 3 lbs. Also operates  
on 32 volts ..... only

**\$245**



USE AS 6 VOLT GENERATOR—Generate your own power. Can be  
operated on your bicycle wheel. Furnishes sufficient power for  
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218RY Screw Driver  
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Model AVC-11, like new. Takes up  
to 5/32" rivet. \$73.00 list. Special  
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**\$8.75**

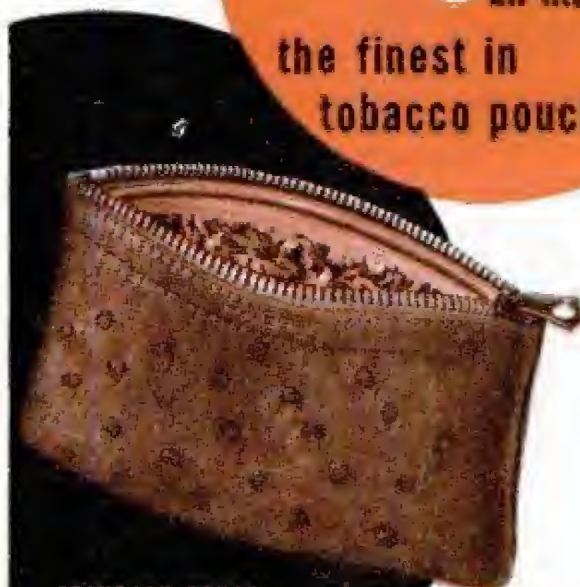
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The Rogers Air-tite\* with its patented inner pouch  
of moulded, seamless rubber, protects freshness  
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Engrave your name... etch letters or designs... place permanent identification marks on anything with this unique hand tool. Carves wood and linoleum, cuts cardboard and balsa, tools leather. Just plug in on any 110 volt AC line. No home shop is complete without a Burgess Vibro-Tool. See your dealer or write for information.



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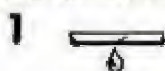
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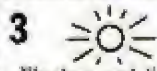
... SAYS THE *Shur Brake Gauge*



1 Leak develops in line—and



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● 600 accidents a day involve faulty brakes! Watch your brake fluid! Install *Shur-Brake Gauge*... be forewarned of accident when fluid pressure drops. Comes complete, ready to install yourself in 20 minutes... under the hood for easy service-

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**Shur WHEEL BLOCK**

Safety when changing tires. Will not skid. Fits any Tire. Easy to use. Reg. \$3.00 list, 2 for \$1.98 postpaid anywhere in U.S.

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## IT STAYS STUCK! WITH... MULTI-PURPOSE AMBROID

If you want permanent results from an adhesive, you can't equal multi-purpose Ambroid liquid cement — for home workshop, household or factory. A quality leader for 37 years, ready-to-use Ambroid is waterproof, transparent, quick-drying, extra strong. Flexible, heat- and corrosion-resistant. For assembling, repairing or mending jobs, keep Ambroid handy. At your dealer's, or send 25¢ for big 2-oz. tube postpaid. Money back guarantee.

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This exclusive patented way... saves 3/4 the time. Does a better job. 25¢ can enough for 4 cars. At your dealer or send 25¢ for can postpaid.

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CLEANS AND WAX POLISHES IN ONE EASY OPERATION!

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Quick and easy. Do your car in less than an hour. Contains expensive, pure Carnauba wax, hardest wax known. Lasts up to 6 months.

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sold in small quantities for the home workshop. Steel, Brass, Copper, Aluminum, etc. In Bars, Shapes, Tubes and Sheets. Write for free price list.

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## SPECIAL OFFER

### Personal Initials in Solid Bronze

Beautiful polished bronze initials, personalize home-craft items — fireplace sets, cigarette boxes, doors; many other uses. Easy to apply to metal, wood, leather or plastics. Order your initials today.

2 Sets Polished Bronze Initials, total 6 letters, 3/4" high, (\$1.50 regular price): Special offer, \$1 postpaid.

Send \$1.00 for 2 sets — money back guarantee.

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### LAWN ORNAMENT-NOVELTY PATTERNS

28 Lawn Ornament Patterns, 25¢. Other patterns: 15-20" high; Dutch Girl, Dutch Boy, Pirate, Bull Terrier, Mexican Girl, Mexican Boy, Dwarf, Penguin, Flower Girl, 10¢ each. 25 Novelty Patterns, 30¢. All 62 Full Size Patterns, \$1.00 Postpaid. Strother Pattern Service, Dept. AH-8, Box 383, Belington, W. Va.

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Work in a fascinating and profitable hobby. Just out—our latest fabricating manual. Tells you how to work with Plastics. Our new Catalogue provides all needed materials: Plexiglas—Lucite—Tenite—Catalin—Acetate—all in sheets, rods, and tubes. Complete line of cements, dyes, accessories and supplies. Send 20¢ today for Fabricating Manual and Catalog. We apply this amount on initial order.

### HOUSE OF PLASTICS

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Here's the most unusual furniture value yet! Your chance to own this beautiful, sturdy Colonial kneehole desk at a saving of 40% of its retail price. This new low price is possible because you assemble and finish the desk in your own home. No workshop needed... just a hammer and screwdriver and you're in for some real fun — and a real saving of \$30.00

## COMPLETELY READY-TO-ASSEMBLE

Made by one of the largest manufacturers of desks, the ASSEMBLY desk comes to you completely ready to assemble in an evening's time — with all parts, materials and simple-to-follow instructions included, all wood sanded smooth and cut to exact size for precision construction.

## DESIGNED FOR BEAUTY

### AND LASTING SERVICE

Imagine an attractive kneehole desk which combines today's graceful lines with the proud Colonial style of the past. The ASSEMBLY desk stands a full 30 inches high and has a beautifully-grained 22x42-inch solid birch top. Finest quality hardwoods are used throughout to give maximum durability and beauty. All wood is aged and kiln dried to meet our exacting requirements. Every piece is specially treated in our factory to prevent warping regardless of climate. You may paint or stain and varnish to suit your taste. When ordering, specify your choice of stain.

## MANY HIGHER-PRICED FEATURES

There are eight (8) roomy lip drawers, including one double-size drawer for filing. Drawer channels are coated with penetration wax to insure free sliding. For sturdiness and ease of construction, we have dovetailed the drawer ends — a feature usually found only in more expensive furniture. Drawer interiors are completely finished, sanded smooth and require only shellac.

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When your desk parts arrive you'll be pleasantly surprised. There are only 16 basic types of pieces — each one cut to exact size. Every piece is marked so that our directions are easy to follow. Holes are drilled to simplify correct and permanent assembly. We supply all necessary hardware and materials.

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Your ASSEMBLY desk comes completely ready-to-assemble in just one enjoyable evening's time. You need no special workshop or tools... just follow our simple directions. Whether you buy it for your home... for your son to bring back to college... or decide to assemble and sell ASSEMBLY desks at handsome profits... you'll be glad that you took advantage of this outstanding offer. Simply send check or money order to ASSEMBLY Furniture Co., Dept. P-1, Somerville, Mass. Money refunded upon return of Kit if you are not satisfied on inspection.



FREE. For further information, write today to ASSEMBLY Furniture Co., Dept. P-1, Somerville, Mass., for our FREE descriptive folder.

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I enclose \$44.45 check (or money order) for the ASSEMBLY desk.

Check stain ☐ maple ☐ mahogany ☐ walnut

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**FOG LENS**  
Pat. Pending

Convert full power of your headlights to fog lights. Each amber colored plastic lens has 3 rubber suction cups. Attach over headlight glass. Use both up and down beam. Approved! Guaranteed! Directions! Supply limited. COD. plus charges.

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POWER LAWN MOWER**

**WHY BREAK YOUR BACK  
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WRITE  
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Now anyone can save time and effort mowing field or lawn by building their own whirl type power mower. Build according to your own ideas and needs at small cost. Cut close to fences, walks, buildings, etc. Build in short time with parts and instructions we furnish. Save hours of time and back breaking labor. Write today for FREE information.

IT'S FUN TO BUILD  
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**NOW! For Only \$5.95 You  
can have an Amazing New  
FLEXIBLE SHAFT TOOL**

with PENCIL-SIZE HANDPIECE

**Grinds, Polishes, Sharpens, Cleans, Mills, Carves,  
Engraves, Etches on Metal, Wood, Glass, and Plastic**

Now you can turn your old motor, drill press, or electric drill into a Flexible Shaft Tool. Amazing new Presto-flex, latest addition to the Foredom flexible shaft family. Simply attach to your electric drill, drill press or motor. Presto—a flexible shaft machine! Off again in a jiffy! Pencil size handpiece gives you finger-tip control. Gets into tight places you can't reach with any other tool. Handy 35" overall length. And—only \$5.95 complete! Order NOW.

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Just send your name and address. We will rush your Presto-flex COD. Pay postman \$3.95 plus postage or send \$5.95 now and we pay postage. Money back if not delighted! If you order Presto-flex for use on motor, specify motor shaft diameter and add 50c for motor coupling. (Available for 1/4", 3/16", 3/8" and 1/2" shafts.) 50 piece accessory set available \$1.50 extra. Order TODAY from

**FOREDOM ELECTRIC CO., Dept. 115**  
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## SLEEPING BAGS

You'll *really* rest in a warm, comfortable, Ta-pat-co Sleeping Bag. There's a variety of styles—lined with your choice of Wool, Kapok, or Down. And they're all high in quality, high in comfort. Many extras like heavy-duty zippers, special foot space, make Ta-pat-co your best buy. See them at your favorite sporting goods or department store.

**The AMERICAN PAD & TEXTILE CO.**  
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Ta-pat-co Sports Shirts are handsome, long-wearing, comfortable. Made of finest materials in many patterns and colors. Be sure to look for the Ta-pat-co label!

Write for free  
full-color Folder.



The experiments are being conducted by companies in the system of the American Gas & Electricity Company with the cooperation of equipment companies.

No new major sources of power for generation show immediate promise of breaking into the coal, oil, gas and water team. The use of atomic power for the commercial production of electricity seems as far away as it did a year ago. The controlling factor commercially will be cost—or the relative price of heat from uranium or plutonium and from coal. Where transportation is a factor, the atom would have the advantage, since a plane could fly in atomic fuel equal to shiploads of coal.

The gas turbine may well be the next major development in the field, but it is not yet a serious rival to the steam turbine. Allis-Chalmers is studying plans for gas-turbine units which would have a full-load capacity of 20,000 kilowatts.

The "broadcasting" of wireless power like radio waves makes interesting dinner-table conversation, but is hooted down by electrical engineers. They compare it to feeding a baby by squirting milk from across the room with a hose. You may get some into the baby, but you'll waste a great deal of milk.

We squeaked through this last winter with a five-percent margin of capacity, according to the EEI, which states that the average reserve this year should be eight percent. More than 5,200,000 kilowatts of capacity should be delivered this year, which should widen the gap somewhat. But, come what may, it looks like another tough December ahead.

## Sawdust-Concrete Home

(Continued from page 109)

precasting machinery. He also cast small and large slabs using simple forms like those used in building adobe houses. Because the concrete is so light, he poured the floors and roof of his house in one slab.

To test the sawdust-concrete, Friberg cast slabs 32 by 48 inches square and 1 inch thick. Close to the edge of these slabs he drove 8-penny nails and drilled rows of holes with a power drill. There was no splitting. Then he sawed off strips an inch wide with a power saw. With a power sander he produced a smooth surface that could be painted. He tested the slab for insulating value and found it equal to a foot or more of concrete.

Friberg believes that a 3½ by 32 by 48-inch slab, which can be precast and cured during spare time, will be useful in farm

(Continued to page 284)

# ARC WELDING

**FOR PROFIT OR PLEASURE**

**EASY TO OPERATE—EASY TO ASSEMBLE**

**OWN THIS GENUINE INDUSTRIAL-TYPE HEAVY DUTY WELDER**

Ideal for all-purpose welding. **SAFE, RUGGED, COMPACT AND EFFICIENT. WILL OPERATE FOR ONLY A FEW CENTS PER DAY.**

Plugs into 110 or 220 AC line. Can be used consistently on 30 amp. fuse. **ALL PARTS DESIGNED TO GIVE LIFETIME SERVICE.** Why pay expensive assembling and shipping costs? **ATOMIC WELDER PARTS** come in a compact box—**YOU SAVE THE DIFFERENCE! ORDER WITH CONFIDENCE!**

Try your **ATOMIC WELDER** for 30 days. If not satisfied, return as is. Your money will be refunded with no questions asked. **IMMEDIATE DELIVERY—WRITE FOR FULLY ILLUSTRATED BOOKLET P-16**

**60 LBS. READY MADE PARTS**

**Only \$24.95**



**ATOMIC WELDER CO.**  
1038 So. 19th St., OMAHA, NEBR.

Sold on 30 Day Money-Back Guarantee.



## Real FIRE PROTECTION!

### WAR SURPLUS BARGAIN NEW—UNUSED FIRE EXTINGUISHERS

- Approved by Underwriters.
- 1 Gal. Capacity . . . Ready to use.
- Anyone can operate them.
- Carbon tetrachloride is non-conductor—will not freeze.
- Stored Pressure Type Shoots 40 foot stream.
- Height 23". Dia. 5".
- Complete with wall bracket.

IDEAL FOR: Home, Office,  
Garage, Boats, Workshop, Summer Cabins, etc.

Lists for approx. \$80.00

*Our Price*

**\$14<sup>95</sup>**

Send check with order.

F.O.B. Ill. Ordnance Depot, Marion, Ill.

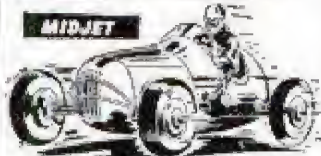
**ACME EQUIPMENT CO. INC.**

126 S. Clinton Street

Chicago 6, Illinois

## NEW KITS only \$1.00 **JET RACERS**

**MIDJET**



**MONO-JET**



Get started in the new sport craze. Enjoy the fun of jet racing. Build these snappy racing models in one evening.

It's a barrel of fun making and racing Monogram Jet Racers. Power with simple carbon dioxide cartridges. Kits include shaped and bored balsa bodies, rubber wheels, steel axles, plastic shields and scoops, instructions and other parts. Mono-Jet, Indian, \$1.25; Hot Shot, original jet racer, 85¢; Aqua-Jet (not illustrated) Jet Speedboat, 85¢. SPECIAL: All five kits \$4.50. All prices include postage. Rush order to



**TERRA-JET**

**HOT SHOT**

apolls Type, \$1.00; Midjet, Midjet type, \$1.00; Terra-Jet, deluxe, \$1.25; Hot Shot, original jet racer, 85¢; Aqua-Jet (not illustrated) Jet Speedboat, 85¢. SPECIAL: All five kits \$4.50. All prices include postage. Rush order to

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ALL MAKES — REBUILT LIKE NEW  
For Business School, Business or Home Use

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**New Improved OTTAWA Buzz Master.** Two speeds for brush cutting and road travel. Clears land of brush, saplings and large trees. Goes anywhere on its own power. Hills no obstacle. Most useful saw ever built—pulley for belt work. Reclaim waste land this easy way. Make big money doing custom work. Endorsed by Conservation experts. Post Hole Digger attachment available. Digs a post hole in 25 seconds. Send for FREE details today.  
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**7 H-P  
MOTOR**



## It's Tune-up Time for Your Car!

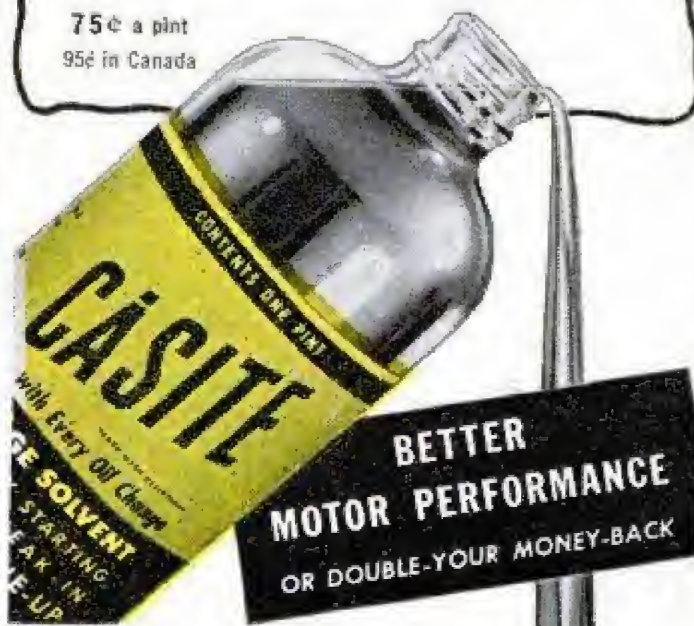
It's time to clean up winter's sludge and gum—step up your engine's performance—with Casite!

And it's high time you gave your engine Casite's extra protection too! Casite cuts engine wear because it improves lubrication—gets oil around quickly and into the tight spots. Casite guarantees Better Motor Performance or Double-Your-Money-Back, no matter what kind of motor oil is used.

Get a Casite tune-up today—from your garage, service station or car dealer. The Casite Corporation, Hastings, Michigan and the Casite Division, Hastings Ltd., Toronto.

75¢ a pint

95¢ in Canada





**DRILL FOR RAWLPLUGS\* or other Masonry Anchors****NEW**

WITH YOUR  
1/4 IN. ELECTRIC DRILL  
AND THE

**DRIL-HAMER\***

Especially fitted to use RAWLDRILLS\* Nos. 6 to 14, and 5/16 in. to 5/8 in. Easily adapted to operate any tool where hammering is required: Sealing, Riveting, Caulking, Gouging, Chiseling, etc.  
\*Reg. U. S. Pat. Off.

(Agents' inquiries invited. Attractive set-up.)

From your Dealer or send check or money order to

**DRIL-HAMER Co.**Box 158 Planetarium Sta.  
New York 24, N. Y.SIZE  
6 1/2" x 1 1/8"**\$9.50**P.P. in  
U.S.A.

No C.O.D.

SAVE LABOR

DO A BETTER JOB WITH A DRIL-HAMER

SAVE TIME



# MOTO-SAW

THE AMAZING ELECTRIC  
SCROLL SAW

Boys from 8 to 80 (and girls, too) have fun with a Moto-Saw . . . it works more like magic than any tool you ever saw! It takes no effort to run, no perceptible pressure to feed. Runs 7,200 strokes a minute . . . easily cuts intricate scroll designs in medium hard wood up to 3/4" thick. Blade holder faces blade 4 ways . . . permits you to saw sideways as well as forward and backward. No limit to length of stock it will cut . . . saws to center of 19" widths. Moto-Saw is as safe as a hand saw . . . has only two moving parts . . . never needs oiling. Uses 110-120 V. 50 or 60 cycle A.C. (only). Thousands of satisfied users.

**MONEY-BACK GUARANTEE:** If your dealer does not yet have Moto-Saw, send only \$5.85 . . . we'll pay postage. Or send \$1. and pay postman balance plus postage. Money back if not delighted after 5 days' trial.

**DREMEL MFG. CO., DEPT. S-118-D, RACINE, WIS.****SPOTLIGHTS 6 Volt \$2.95****5 Lights in One**

Furnished with 4 emergency anaplan lenses. Red, Amber, Green, Blue. Equipped with standard 6 volt seal beam bulb. Pistol grip trigger switch with directional swivel base—built-in toggle and pistol trigger switch . . . . . **4.95**

Ideal for police—fire depts., State patrol, taxi cabs, ambulances, tow trucks, farm tractors, implements, boats, contractors machinery, hunters, fishermen, campers. Other uses.

Write for descriptive circular • No COD • Prices FOB, Kansas City

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Kansas City, Mo.

Men's Fully Guaranteed **NEW \$13.95**  
**15-JEWEL WRIST WATCH** PLUS TAX

**ORIGINALLY sold up to \$55**

Sacrificed because they're post-war surplus

**LOOK AT THESE FEATURES:**

Luminous dial . . . sweep second hand . . . waterproof . . . shockproof . . . anti-magnetic . . . imported Swiss precision movement and case. You get them now for a small fraction of original prices. Don't delay! Order now while they last. Send only \$1 down payment with order. Pay balance to postman on arrival, plus postage. Or we pay postage if you enclose \$13.95 plus \$1.30 Fed. Tax.

Receive Reg. \$2 expansion band FREE with prepaid order. Money back in 5 days if not delighted. Order now.



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# CARBURETOR TOO RICH

**MAKES MOTORIST TOO POOR**



Car owners who are wasting money and not getting proper gas mileage due to over-rich mixtures will be pleased to learn how to save gasoline by VACU-MATING over-rich mixtures. VACU-MATIC fits all cars, trucks and tractors. It is automatic and operates on the supercharge principle. Easily installed in a few minutes.

**SALESMEN WANTED! Big Profits!**

Send name, address on penny postcard for free particulars and how to get yours for introducing.

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**BASS**  
IS BEST  
WEEJUNS  
LEISURE  
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**BASS**  
IS BEST  
QUAIL  
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FIELD and STREAM



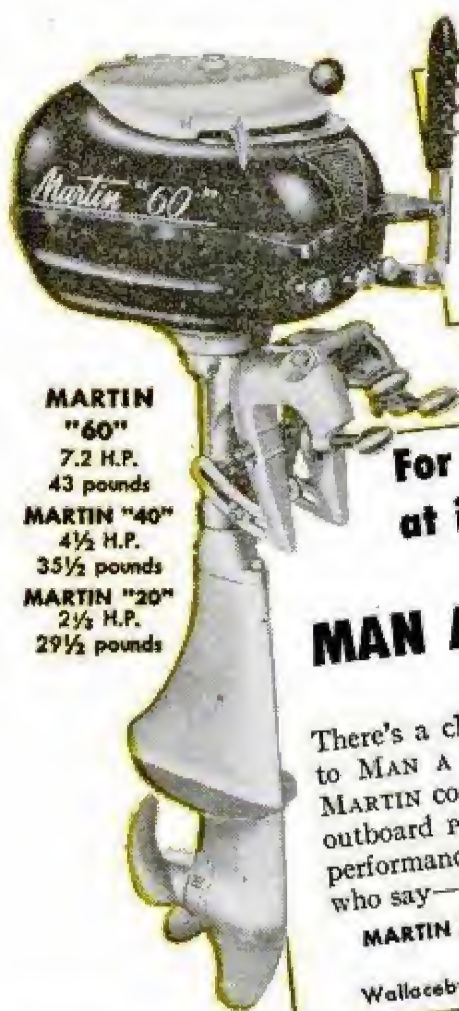
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IS BEST  
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SPORTCASINS  
GOOD GOLF STRATEGY  
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60 MAIN STREET  
WILTON, MAINE







**MARTIN**  
**"60"**  
 7.2 H.P.  
 43 pounds  
**MARTIN "40"**  
 4½ H.P.  
 35½ pounds  
**MARTIN "20"**  
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 29½ pounds

**MAN A MARTIN** for thrilling top speed performance. MARTIN's exclusive patented, mechanically-controlled poppet valves set a new standard of performance in outboard motors.

**MAN A MARTIN** for smooth, unbelievably slow trolling speeds. MARTIN's spatter-free operation at slow speeds adds to fishing pleasure.

**MAN A MARTIN** for more family pleasure on the water. MARTIN has the features for all around easy handling by any member of the family.

**For outboard motoring  
 at its best . . .**

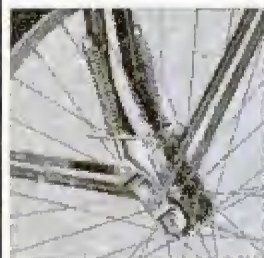
**MAN A Martin**

There's a choice of three great outboard motors, when you decide to MAN A MARTIN, and enjoy outboard motoring at its best. A MARTIN combines all the finest features you would expect in a great outboard PLUS exclusive features which have enabled it to set new performance records. Take a tip from America's keenest sportsmen, who say—"for tops in outboarding . . . Man a Martin!"

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## **SHOCKMASTER for all Bicycles**

- LEVELS ROUGH ROADS
- PREVENTS BROKEN SPOKES, WHEELS, FORKS
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- EASY TO INSTALL

A Shockmaster and front wheel shock absorber. Ruggedly constructed of nickel plated steel and engineered for years of real service. It'll pay for itself in added pleasure, saves tires and eliminates many costly repair bills. 20,000 satisfied users. Order yours today. Only \$3.69 postpaid. No C.O.D.'s. Complete satisfaction or money back. Dealers Wanted.

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## **PLATE WITHOUT ELECTRICITY! . . . on any surface!**

New discovery plates hard, non-corroding nickel alloy on any wood, leather, or metal surface (except chrome, zinc, or white metal). Wears like chrome. Thousands of home uses: door knobs, golf clubs, baby shoes, hobby parts, etc. No electricity, anodes, or fixtures—just add water. Kit contains everything needed for 5 full hours of plating. **MONEY-BACK GUARANTEE:** Use 10 days according to directions; if not completely satisfied, return for full refund.

### **MAIL THIS HANDY ORDER FORM**

Metal Processing Co., Inc., P. O. Box 2814, Paterson, N. J.  
 Ship one standard LUSTRALOY PLATING KIT, prepaid. Check for \$12.50 enclosed.

Name \_\_\_\_\_

Address \_\_\_\_\_ (448)



It is now possible for home craftsmen . . . and garage-men, gunsmiths, and repairmen . . . to turn and cutoff metal without buying an expensive lathe. This new tool converts woodturning lathes, drill presses and grinder stands into precision metal lathes. **TRU-TURN** has a built-in micrometer . . . turns and cuts-off steel, brass, aluminum.

**TRU-TURN TOOL** — Two guide bushings; and bits for steel, brass and aluminum . . . only \$11.75

**FACE-PLATE WORK-DRIVING CHUCK**—For converting woodworking lathe. Chuck plus three adapter bushings . . . only \$4.50

Add 25c to each item for C.O.D. orders. Send money order or checks for prepaid shipment within U.S.A. Illustrated folder free.

**MILLHOLLAND SCREW PRODUCTS CORPORATION**  
 134 West 13th Street, Indianapolis 2, Indiana



# EASIER SANDING 10 Times Faster!



## HOME Craftsmen!

Why wear your skin down to the bone with hand-sanding drudgery? This sturdy, light Belt Sander turns out smooth, expert sanding in minutes—instead of hours.

On wood, metal, stone or plastics . . . on flat, straight or curved surfaces, this time-tested Porter-Cable Sander gives you a beautiful, professional finish. Does refinishing, clean-up work. Smooths glued joints. Hollows out. Removes paint and varnish. Gives final finish.

Powerful motor speeds 2" x 21" abrasive belt at 600 surface feet per minute. Over-all size 4" x 12" x 6". Weighs only 12 lbs. Operates in any position.

Model A-3, — 3/4 hp — \$99.50

Model A-2  
**\$57.00**

## For Heavier Sanding in Less Time



### BB-10 Sander

Size and speed suits it to production sanding and planing. Easy to handle in continuous work. Perfect balance . . . Instant belt change . . . Dust-free operation. Excellent for wood shop, maintenance jobs, and many industrial uses. Extra powerful!

HP motor. Abrasive belt is 3" x 27". Speed: 1475 s.f.p.m. Overall size 5" x 18" x 9 1/4". . . . Weighs only 36 lbs.

**COSTS ONLY \$148.00**

Pays for itself in a few weeks.

## New Abrasive-Belt BENCH GRINDER

Unit can be attached to bench motor. In any shop—on production lines—or in the home—this abrasive belt-type Handy Grinder increases production 200% over ordinary wheel grinder. Deburs, chamfers, bevls, knocks off corners, etc. Eliminates wheel loading, wheel dressing, wheel digging. Grinds on contact wheel, formed contour wheel, platen or free belt. Easily adjusted to any position within 90° arc.



**COSTS ONLY \$39.50**

## See These Time-Saving Tools

At leading hardware stores, mill and building supply houses. Meanwhile, write us for further information on the many uses of these tools, carrying lifetime guarantee. We'll also send you the name of your nearest dealer.

**PORTER-CABLE Machine Co.**  
2050-4 N. Salina St. Syracuse 8, N. Y.

buildings. This size will span two studs or floor joists or can be sawed to fit between studs. Northwest farmers already are showing interest in its use for dairy barns and poultry houses where the need is great for a low-cost material that has high insulating value.

Someday a method of waterproofing the concrete may be found. Until then Friberg recommends that it be used indoors only. It has another limitation also. With a load strength only one quarter to one third that of ordinary concrete, it can't be used in sidewalks or driveways or for floors and walls that carry heavy loads.

But even if these limitations are never completely overcome, Friberg sees a tremendous field for the tiny diatom and the sawdust and shavings piles. His living-room floor, for example, is a solid block of the low-cost material. Carpet and linoleum are fastened directly to it. The roof also is a solid block, covered with roofing paper and pulverized pumice stone. In the walls of his house the main load is carried by a layer of regular concrete bricks. Double-thickness sawdust-concrete bricks provide the insulation.

Since diatomaceous earth deposits were investigated during the war, state departments of geology and schools of mines have information on their locations. So, if the prospective builder can locate a convenient pile of pine, larch or fir sawdust and shavings and it isn't too far from a deposit of diatomaceous earth, Friberg has found a way for him to bring them together to produce a new type of low-cost building material.

## Iceberg Hunt

(Continued from page 118)

**June 11**—The Mendota put into the Argentina Naval Operating Base to refuel and replenish provisions. The ever-welcome mailbags came aboard. Officers and crew got a few hours shore leave to get the kinks out of sea legs.

The Mendota was ordered to take bathythermograph observations in the Labrador current and to cruise along the west coast of Greenland and into Davis Strait and Baffin Bay. It is here that icebergs are born. Several thousand shear off each year from the 100 or more glaciers along Greenland's west coast. They spend the first winter near Melville Bay, the second in the vicinity of Cape Dyer and drift into shipping lanes the next spring and summer.

Data on currents, icebergs, pack ice and weather conditions would be useful next

(Continued to page 288)



# Don't Risk Engine Overheating

Keep cooling systems  
ALWAYS up to par  
with regular

**Warner** care



**Warner Liquid Solder (Non-Metallic)**

• Deposits tiny fibers to repair leaks anywhere in the cooling system.

**Warner Radiator Cleaner**

• Thoroughly cleans cooling system of rust, oil muck and grease.

**Warner Cooling System Protector**

• Prevents rust, scale and corrosion.

No delays—just pour in and keep on driving. Do it yourself, or ask your service man.



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CALIFORNIA STYLE  
BARBECUE FURNITURE

**Make Your Yard & Living Room!**

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**TRAILER BUILDERS!**

**BUILD or BUY... SPECIFY**

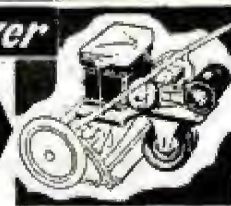
• Torq-Less Axles • Bull Dog Hitches and Parking Jacks, Safety-Engineered by  
**HAMMER BLOW TOOL COMPANY**  
Dept. 121 Wausau, Wisconsin

Send for FREE Catalog

## POWER Your Lawnmower

Convert Your Mower to a Power Mower. Use old auto generator and car battery or gas engine. Plan also shows how to make an electric rotary-blade mower from easy-to-get materials. Complete plans and catalog, 35c.

**LEJAY MFG. CO.**  
847 LeJay Bldg., Minneapolis 8, Minn.



## USEFUL SURPLUS BARGAINS

### FISH LURE and LIGHT

Uses one ordinary flashlight battery. A floating fish lure that brings 'em in. Also can be used as a regular flashlight. Brand new.....

**\$1.29**

**A to Z Steel Letter**

**PUNCH SETS**  
1/4" — \$6.50  
3/8" — \$7.95  
1/16" — \$1.95



### New Precision Bilt MICROMETERS

Chrome finished, nationally known makes. Give a lifetime of accurate detailed service. Individually boxed.

1" Central .....\$3.50 4" Central .....\$6.25  
1" Lufkin .....\$4.25 2" Reed .....\$5.25  
6" Stoumb. ....\$7.50

Prices FOB, Kansas City. Send 25c for handling and mailing.

**ATLAS SALVAGE & EQUIPMENT CO.**  
229 SW. BLVD. KANSAS CITY, MO.

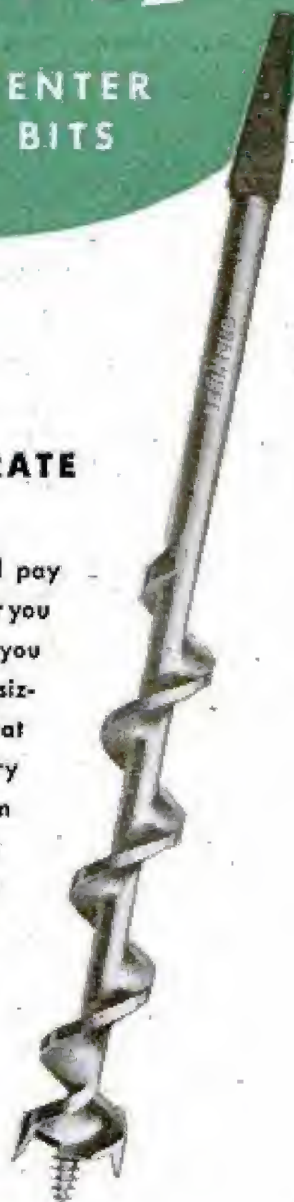


*Greenlee 22*

**SOLID-CENTER  
AUGER BITS**

## FOR FAST, ACCURATE WORKMANSHIP

GREENLEE 22 is a name it will pay you well to remember whenever you buy Auger Bits. For it assures you sharp cutting edges, accurate sizing, bright, high finish, and that smooth, easy action so necessary in fine craftsmanship. You can be certain, too, that every GREENLEE 22 Solid-Center Auger Bit is "factory sharp" when it reaches you. For each is "Plastic-Sealed" with a special protective coating to keep it in perfect condition for you. To buy top quality, buy GREENLEE.



TOOLS FOR CRAFTSMEN

**GREENLEE**



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Quick solutions to countless woodworking problems. Just set dial: convert linear feet to board feet; compare characteristics and workability of various woods. Also shows bit



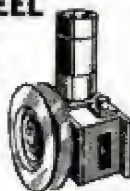
sizes; nail specifications; tool sharpening hints; etc. Heavily varnished cardboard, 6" diameter. Send 10c to Greenlee Tool Co., 2104 Columbia Avenue, Rockford, Illinois, U. S. A.



# WAR SURPLUS AND OTHER BARGAINS

## POWER DRIVEN ANTENNA REEL

1/2 HP, G. E. Motor—12-24 V. Removable 6" Reel. Cam worm gears, bevel gear, Solenoid clutch. Is gear only when current on. Operates clockwise or counter clockwise. Ideal for power fish line, opening or closing doors, auxiliary power take-off. Can be used as buffing machine or for dozen of other uses. New. Weight 6 Lbs. \$4.50 each.



## MICROMETER

Chrome plated, precision engineered and carefully tooled to give long life

All new. 0.1" capacity, \$2.25. 1-2" capacity, \$3.50 Each. SEND CHECK, MONEY ORDER or CASH



## SHIP'S BELL:

U. S. Navy Surplus. Solid Brass with smooth polished finish. 5" Diameter. Great for Patios, Doorways, in Dens, Ranches, etc. Matching solid brass wall bracket included. Weight 3 1/4 Lbs. All New. \$5.95 Each.



## GEAR PUMP

For circulating liquids... oil or water. Will operate on 1/10 H.P. Pumps 3 gals. per minute at 1700 R.P.M.

Hardened steel gears, bronze bushings, aluminum housing. 2" diameter, 3 1/4" long. Wgt. 2 lbs. New... \$3.50 each.

**4 in 1 SCREWDRIVER:** 3 smaller screwdrivers fit compactly into hollow barrel of largest screwdriver. Sizes... 6", 3", 1 1/4", and 1" overall. Fine steel bits. Solid brass knurled handles for non-slip grip. Large enough for standard screws, small enough for watches. Will handle all sewing machine screws. A handy all-purpose tool for kitchen, garage, or workshop. All New... \$1.00 per set.



25% DEPOSIT REQUIRED ON C.O.D. ORDERS

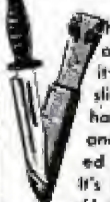
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We have been awarded 100,000 genuine briar pipes by Quarter-master Corps. Assorted shapes and sizes. All popular makes. Set of 6, \$3.50



## FISHING AND HUNTING KNIFE

Hollow ground 6" blade of bright finish, high quality, tempered steel. Non-slip cowhide handle, with hand finished metal guard and butt. Stitched and riveted genuine leather sheath. It's a knife you'll be proud of! All New... \$1.50 Each.



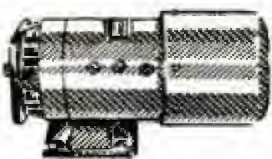
**CLIPS:** Rubber lined, aluminum, hundreds of uses in any shop. Assorted sizes, all new. 5 Doz. \$1. — 500 \$5.

ALL PRICES F.O.B. CULVER CITY, CALIF.



## BLOWER COOLER or HEATER:

For trailers, autos, offices, darkrooms, homes. DUMORE Motor, 1/6 cont. HP, Amperage 7.5, RPM 6400, 24 Volts. May also be used as dryer. Simple installation, radiator type, copper coils. Transformer advertised in this ad will operate this unit from house current. Weight 13 Lbs. New, \$15.00



## EMERSON 3 HP MOTOR:

AAF Type D50. This motor can also be used as generator when driven by another motor. Ideal for portable welder, etc. 28 Volts, D.C. Compound, 3800 RPM, 115 AMP. windings glass insulated, blower cooled, shaft dimension 5/8". Weight 27 Lbs. New. \$13.95 each

shaft dimension 5/8". Weight 27 Lbs. New. \$13.95 each

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Cut your fixture replacement, water and fuel bills with Economy Renewable Seats. Make economical, permanent repairs quickly and easily with the Junior Kit (illustrated). Repair bathroom, kitchen and laundry fixtures. Everything you need included in steel box. This is a natural for the "Fixit" shops—get extra income from making permanent repairs on your customers' faucets.

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BRAND NEW \$2.95 each

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## BUILD AN ARC WELDER FROM OLD GENERATOR

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- ★ STOP WATCH
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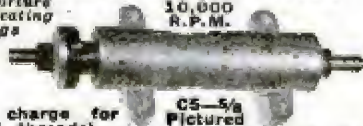


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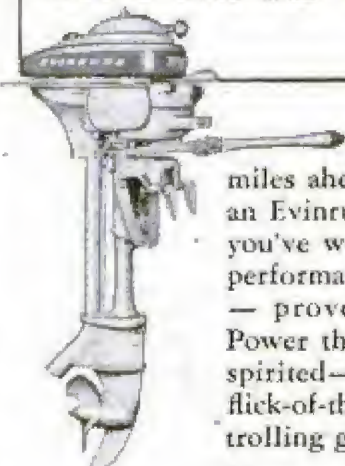
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year in predicting the number of icebergs likely to venture across shipping lanes.

Nine hours after putting in Argentina, the Mendota was on her way again.

**June 13**—About 175 miles northeast of Newfoundland a berg was spotted approximately in the center of the Labrador current. A cold and rough night was spent drifting with the ice mass to chart its course. The crew tried (unsuccessfully) to plant a wood-and-tinfoil target on the berg so that radar tracking would be easier.

**June 15**—The Mendota's bathythermograph winch was in use day and night, three times an hour. The deep-sea thermometer, which resembles a baby torpedo, was lowered every five miles approximately 900 feet and hauled back with the cold, scientific facts to be recorded.

This bathythermograph "cross section," taken directly across the axis of the cold Labrador current, when analyzed by oceanographers will have peculiar importance in revealing the mood and intent of the Labrador stream.

**June 17**—In the Strait of Belle Isle, the Mendota's radar picked out a few small bergs grounded near shore.

**June 18**—With the bathythermograph work nearly completed and the weather fair again, the skipper allowed all hands to try their luck at fishing. In this latitude full daylight lasts from 3:30 a.m. to 11 p.m.

**June 25**—The Mendota cruised south again and searched in a dense fog for a berg reported drifting 200 miles southeast of Newfoundland.

**July 5**—The only thing of interest sighted during the past several days of blanketing fog has been numerous dead sea gulls and thousands of feathers on the sea.

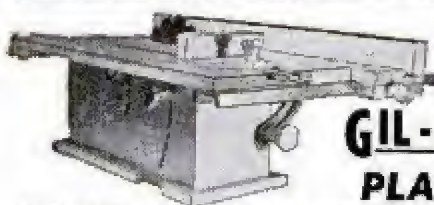
**July 6**—The Mendota has discovered the long-lost berg after receiving a report of its position from the SS William Wheelwright. The stray mass had drifted around the Grand Banks and considerably farther west than computations had allowed for. Since its discovery, the Mendota has drifted with the berg, warned ships, and watched it calve and melt down to a fair-sized growler.

Dynamite, other explosives and gunfire have been used to break up icebergs, but this technique has not been successful. Bergs are too large and their bulk too well concealed below the surface.

**July 7**—The Mendota arrived in Argentina after being relieved of its duties by the Coast Guard cutter Spencer. Thousands of cargo and passenger ships had crossed North Atlantic shipping lanes in safety—thanks to the ships and men of the Coast Guard on International Ice Patrol.



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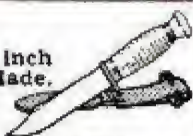
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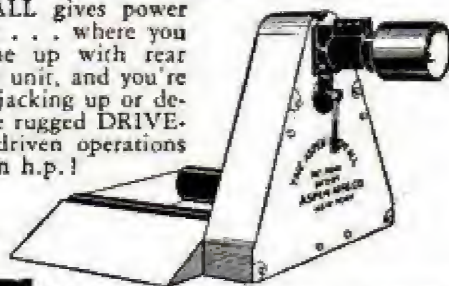
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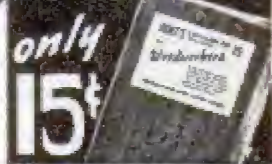


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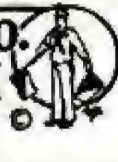
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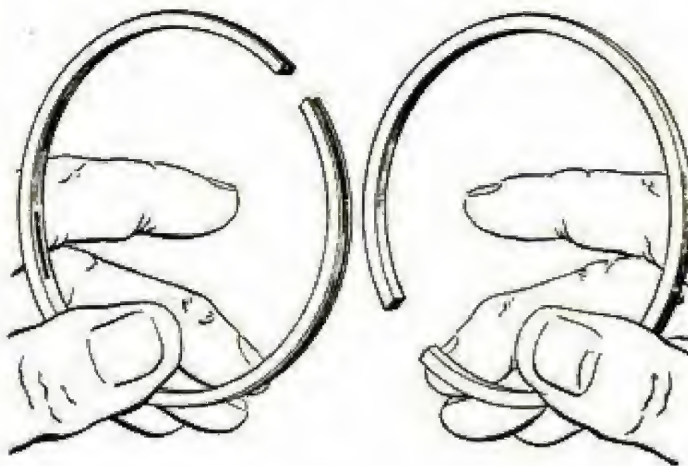


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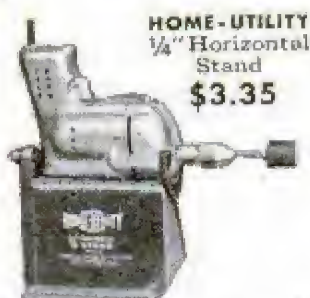
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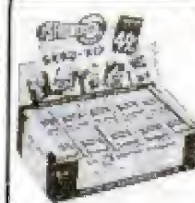
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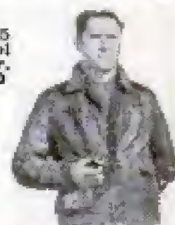
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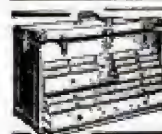
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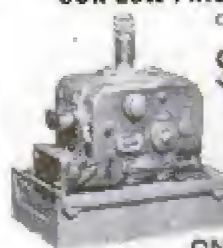
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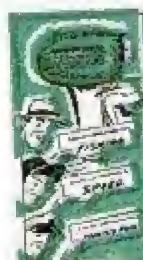


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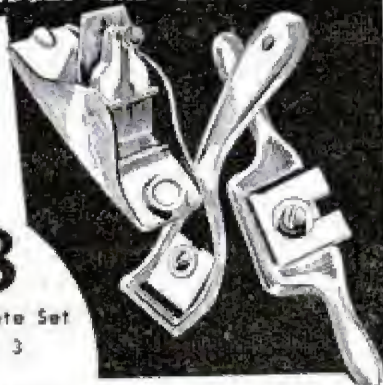
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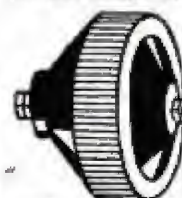
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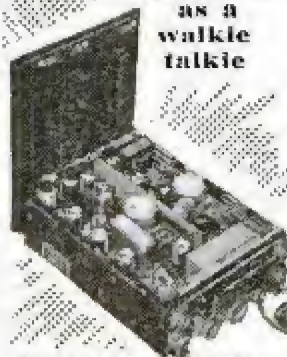
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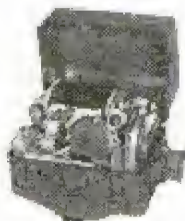
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Makes excellent home lighting plant, operated by wind propeller, waterfall, gas engine, or hand crank. Reduction gear allows full output at slow speed; supplies 6 volts at 2.45 amp., 425 volts at .115 amp. New. Add postage for 28 lbs. **\$7.95**



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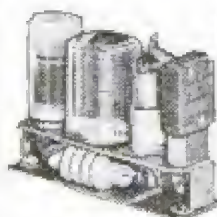
110-volt AC-DC operation

**\$5.95**

An ideal way to learn radio. This kit is complete ready to assemble, with tubes and all other parts. Operates from AC or DC. Simple, clear detailed instructions make this a good radio training course. Covers regular broadcasts and short wave bands. Plug-in coils. Regenerative circuit. Operates loud speaker. Battery model for use where no AC house current is available. Add postage for 3 lbs.



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## MIDGET TRANSMITTER KIT

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**\$3.95**

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Complete kit to build a beautiful 5" oscilloscope. Ideal for studying and servicing television and FM radio. 6 tubes including 5BP1 cathode ray tube. 1500-volt power supply operates from 110-V 60 cy A.C. Has compensated vertical and horizontal amplifiers and 15 cy to 30 KC sweep generator. Detailed instructions make assembly easy. Shipping weight, 35 lbs. Nothing else to buy **\$39.50**



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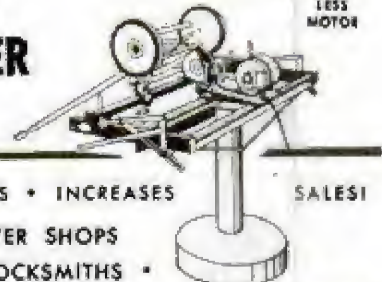
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Address.....  
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\$241.50  
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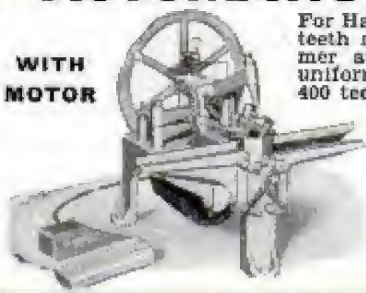


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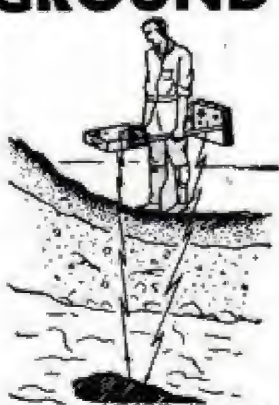
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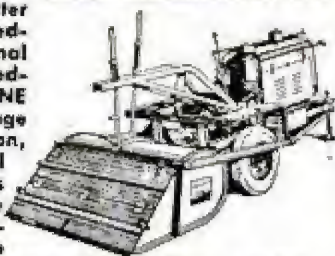


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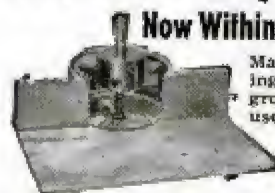
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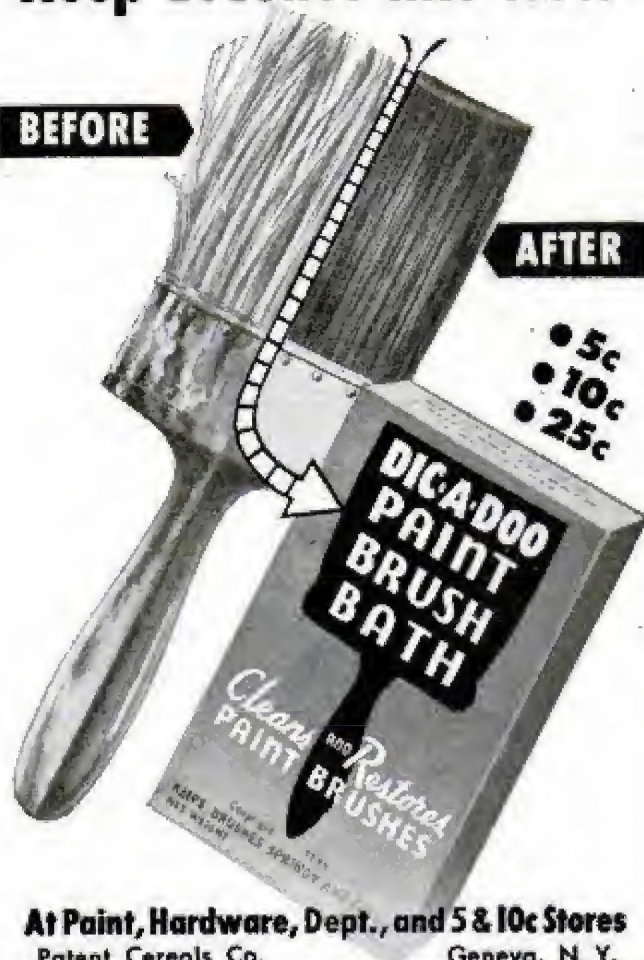
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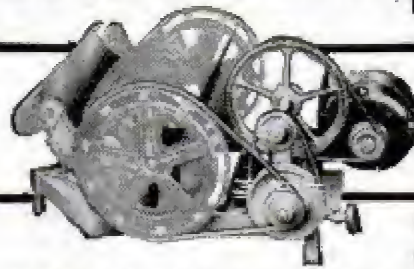
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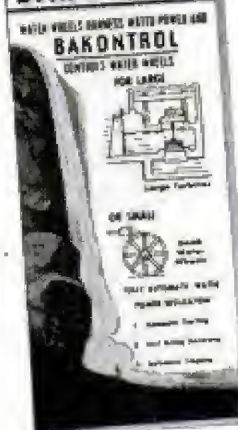
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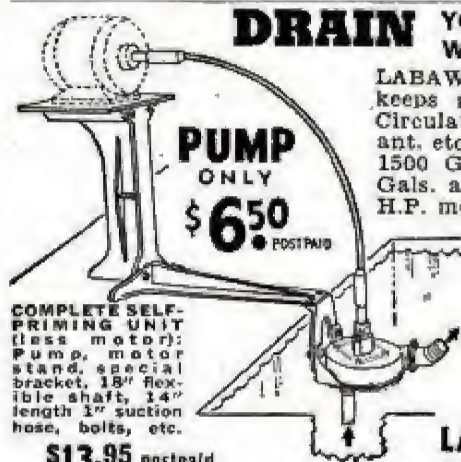
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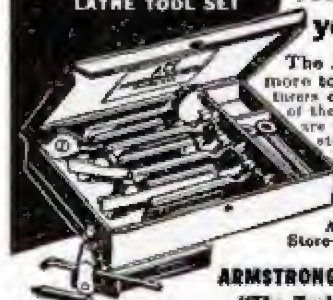
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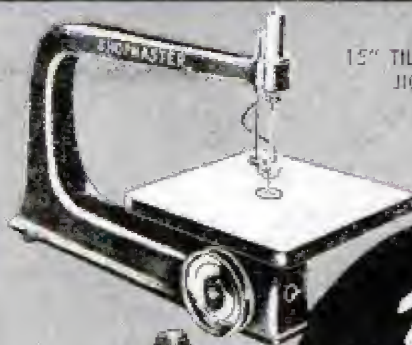
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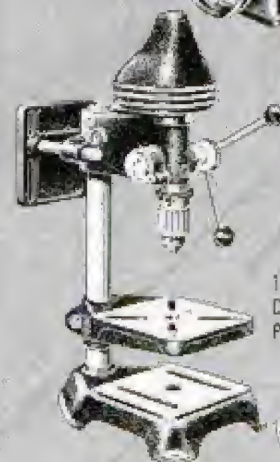


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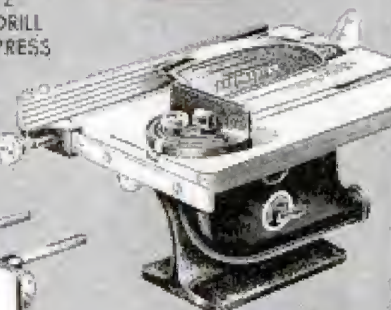
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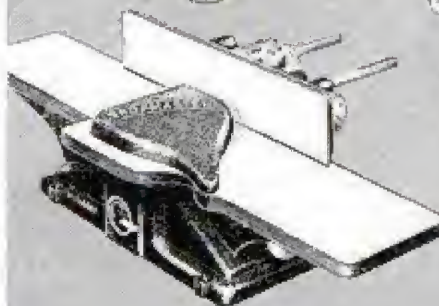
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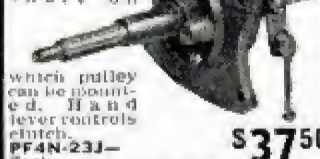
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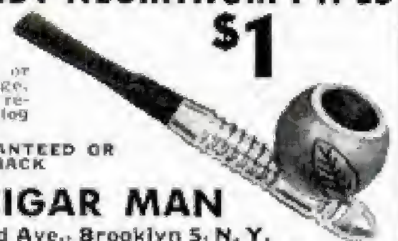
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During the war, simply by water injection, up to 600 additional horsepower was gained by U. S. fighter planes. Water injection also helped the P-80 Jet Plane bring back to the United States the world's speed record of 623.8 M.P.H., June 20, 1947. Now, you can have a Gazda OCTANATOR, giving you—

**GREATER ACCELERATION**  
(20% to 30% horsepower increase)

**SMOOTHER PERFORMANCE**  
(Eliminates destructive knocking)

**AMAZING ECONOMY**  
(15% to 20% more miles to the gallon)

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Patented throughout the world

For Cars,  
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The Gazda OCTANATOR is easily installed in place of your present air filter.



- 1. MORE HORSEPOWER**  
Greater acceleration for overtaking.
- 2. REMOVES CARBON**  
Cleans pistons, piston rings, cylinder heads, valves, spark plugs.
- 3. NO MORE KNOCKING**  
Smoother performance.
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- 8. NO EXTRA WATER TANK**  
Fed by radiator—no hand operated; no moving parts.

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**WORLD'S  
Smallest  
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AID**

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**NEW 1948  
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## With The Amazing "MAGIC SILVER CIRCUIT"

● Sensational tiny size—so small the entire unit can slip into the watch pocket of a man's trousers—yet, with a special receiver so powerful, it transmits 2 to 6 times more sound intensity than any other aids! Midget size made possible at last by great war-discovered secret—"The Magic Silver Circuit!" Try it, and you'll agree... there's no finer hearing aid!

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☐ Right Ear ☐ Left Ear

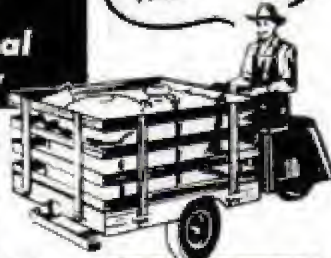
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1½ Horsepower with cultivator 500-12 pneumatic tires, powered with Briggs and Stratton engine, and many other features. Deliveries being made now. Prices slightly higher West of Rockies.

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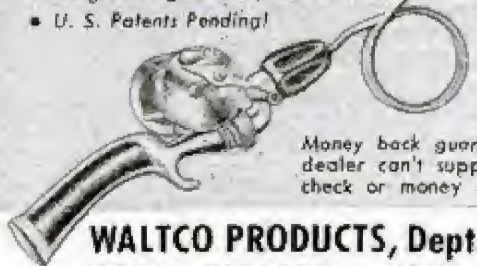
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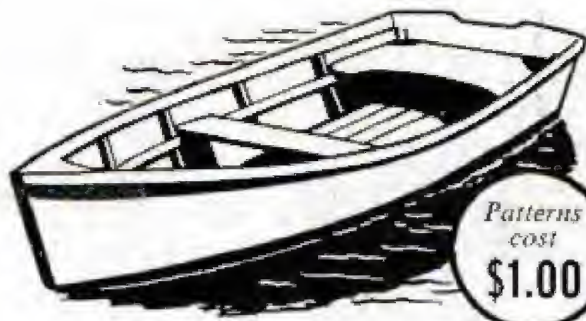
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Build your own rotary type lawn or weed cutter.

Take the hard work out of weed cutting. Build yourself an up-to-date weed and lawn mower with the Nu-Way heavy duty unit.

Write for Free Circular—We Supply Cutting Unit Complete  
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Patterns  
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**Easy... Inexpensive... Better!** You can build this 11½ ft. boat yourself. Just trace pattern on wood; saw, and assemble. Step-by-step directions, assembly illustrations, plus *Cascophen*, Casco's new completely durable, waterproof glue, make it easy.

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Boats, outdoor furniture, sports equipment—joints that must withstand outdoor exposure—*Cascophen* (Resorcin Resin Glue). The first completely durable glue available to homecraftsmen.



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Coated Lenses

## U. S. NAVY

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COMPLETE WITH CARRYING CASE AND STRAPS, PLUS 20% FEDERAL EXCISE TAX

PRICE  
**\$95**

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**SPOTTING SCOPE or MONOCULAR lens sets.** Consists of Achromatic Objective, 2 Prisms, Eye and Field Lens and diagram, all lenses are cemented. Buy 2 sets to construct a High Power Binocular.  
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Portable—No moving parts—Cleans anything—Motors—Chassis—Machinery—Floors—Buildings—Remove wallpaper—Dairy & Creamery—Oil Rigs etc. Oil fired—Economical—fully tested and warranted. 75% Steam in less than 10 min. Model 70, Complete as illustrated..... **\$276.50**

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Lots of 10—Each...\$4.90 Lots of 50—Each...\$4.75  
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Heavy duty super charger rotary pump designed to efficiently pump water, oil, gasoline, etc. Also used as a vacuum pump. Includes lovejoy coupling for 3/8" shaft. 1" outlet on top, 1" outlet on bottom. Size of pump 7 1/2" W. x 5" D. x 7" H. Compact and sturdy. Will pump approx. 30 gals. per minute at high speed. Four mounting holes in base. Can be used with 1/4, 1/2, or 1/2 H. P. motors. Shpg. Wt. 19 lbs. List \$48.00.

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The Finest Tool Box Ever Made

Length 16"  
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Adjust the removable partitions in both big trays for your own arrangements of nuts, bolts, screws, pliers, or fishing tackle. Both trays are 1 3/4" deep; the top tray has cork lining. Sturdy, long-life service, heavy sheet-steel construction, continuous piano hinge, deep-drawn streamlined cover, quality chromium plated hardware. Corners are nicely rounded and the exterior is finished in latest gray wrinkle enamel, contrasting smartly with the deep green trays and interior. There's real carrying comfort in the easy-grip leather handle! It's the finest box in our 20 years of box-making. Only \$7.75 prepaid to you (\$7.85 south and west; \$7.95 Pacific Coast). At your dealer... or send check or money order. Master Metal Products, Inc., 277 Chicago St., Buffalo 4, N. Y.





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SAVE TIME, WORK, MONEY!

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These rugged walking or riding tractors ideal for farm, truck garden, orchard, poultry farm. They operate on a few cents an hour. A child can handle them.

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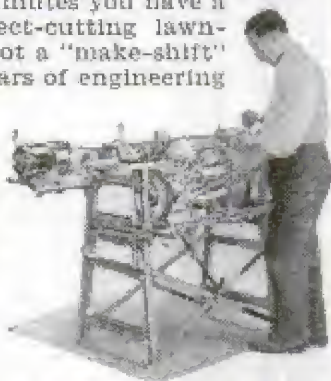




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**\$4.95**

64 DRAWER \$8.95

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THE HANDY WAY TO KEEP SMALL PARTS, WASHERS, NAILS, SCREWS, NUTS, BOLTS AT HAND

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1 1/4" DEEP  
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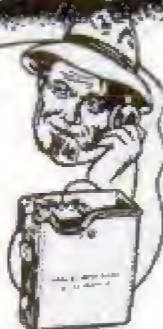
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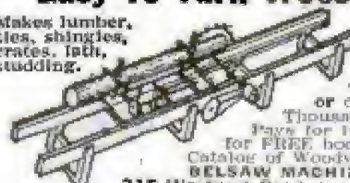
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Makes lumber, ties, shingles, crates, bath, studding.



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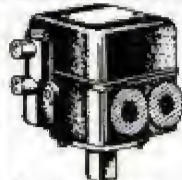


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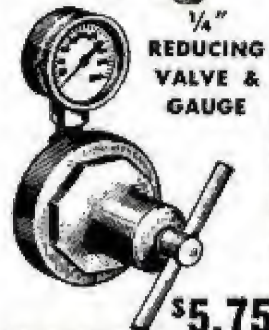
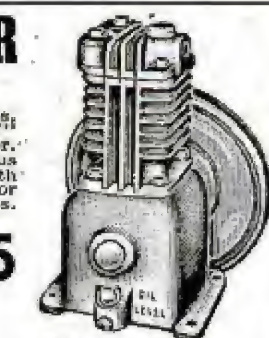


125 to 150 lb. Pressure.  
Use with 1/4 to 5 HP Unit.  
**Only \$8.95**

1/4" air check valve... \$2.50  
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2 1/2" air gauge, 160 lb. 1.75  
1/4" safety valve,  
125 lb. .... 1.50

Prices are F.O.B. Chicago. Immediate delivery. **SOLD ON MONEY BACK GUARANTEE.** Send check or money order today.

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1/4" **REDUCING VALVE & GAUGE**

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Oil resistant, pressure 0-to-200 lb. Reduced pressure 0-to-75 lb.; 3 outlets 1/4". Wt. 2 lbs.

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12 x 1.75" ..... \$3.25  
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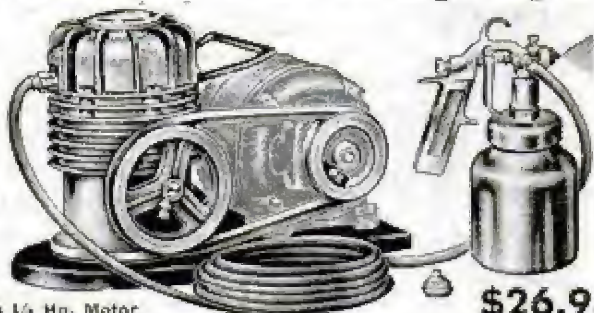
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Uses 1/4 Hp. Motor

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Complete as illustrated, less motor. Sprays all kind of paint, lacquer, varnish and etc. Oil-less ball bearing compressor, 2 cu. ft. air per minute. 15 to 50# pressure. Sprays paint 5 times faster than hand brushing.

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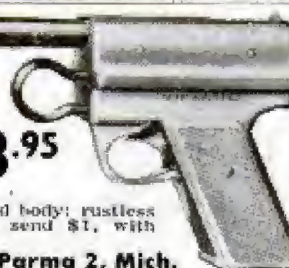
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*Easy to Build*  
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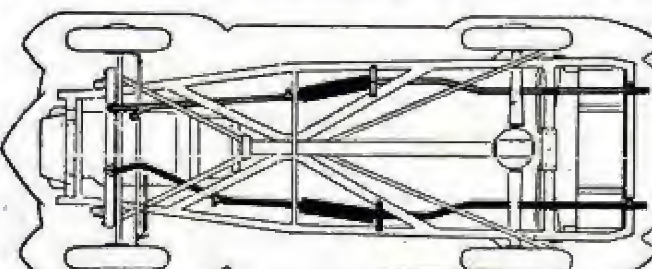

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"MASTER *Streamline* gives me quick, accurate measurements"



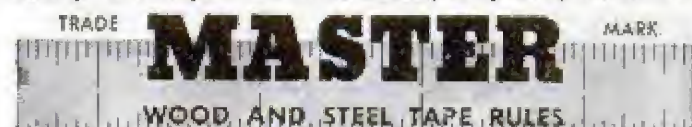
Says Mr. Larry Klohs

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"Streamline proves indispensable for the many measurements I make on the job and in my home workshop".

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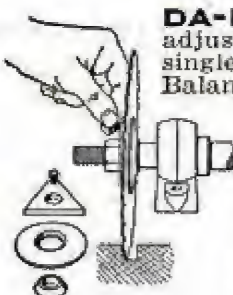
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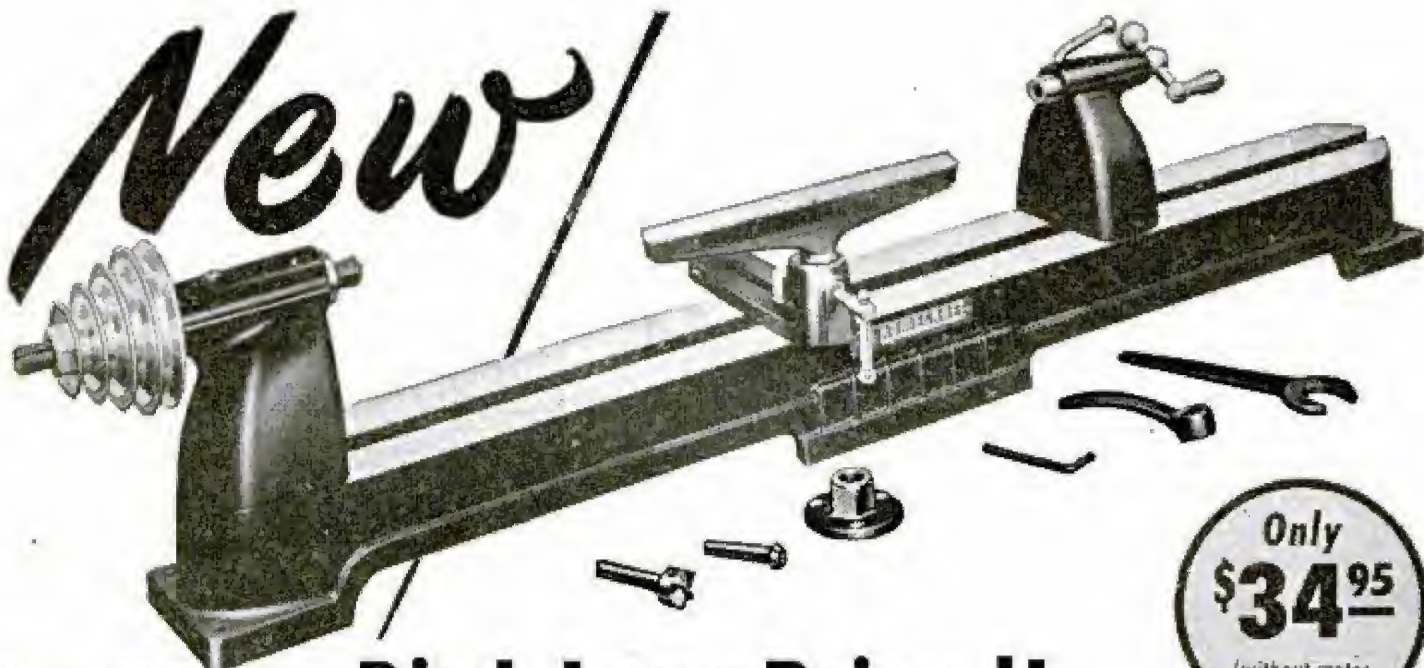
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Only  
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Designed specifically to satisfy hobby-shop requirements, this lathe is a real value for the money!

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The Homecraft 10-inch Lathe is a really good, popular-priced tool that is exactly suited to your home woodworking needs.

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- Spindle is carried on oil-impregnated bronze bearings which provide long, trouble-free service and smooth operation.

- $\frac{3}{8}$ " hole in spindle permits repetition work and use of long-rod stock.
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- Carefully-ground ways, front and back, provide sturdy base for locking headstock, tailstock, tool support base, and accessories.

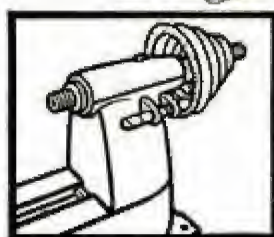
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Ask your Homecraft dealer to show you this new No. 46-110 lathe, and his complete display of Homecraft Power Tools that range in price from \$29.95 to \$41.95.

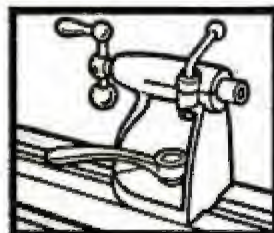
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**HOMECRAFT®  
POWER TOOLS**

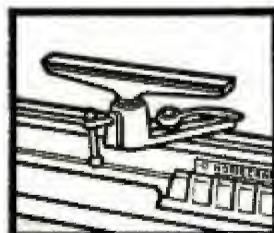
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Husky headstock drives from either bottom or rear. Machined for No. 1 Morse taper. Indexing mechanism is built in.

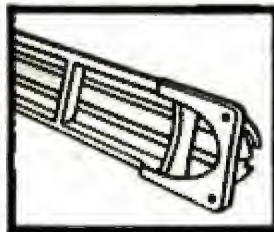


Substantial tailstock locks to bed with convenient hand lever. Centers are self-ejecting — machined for No. 1 Morse taper.



Above: Tool support locks quickly and firmly to groundways of lathe bed. Provides secure support for tool rest.

Below: Cast-iron bed is heavily ribbed, to prevent any warping or "give".



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are built by the makers of Delta-Milwaukee\* Power and Machine Tools — the tools with a widespread reputation for safety, accuracy, and dependability, in factories and schools, as well as home shops.

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Please send descriptive literature  
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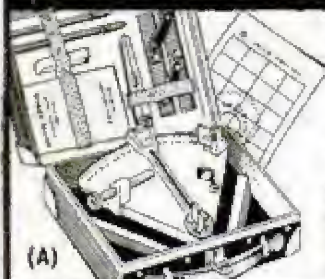
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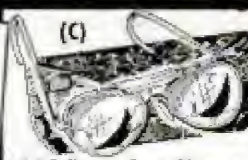
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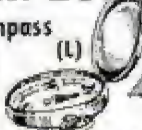
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NEW *Zenith* "75"  
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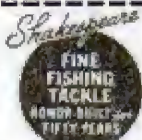
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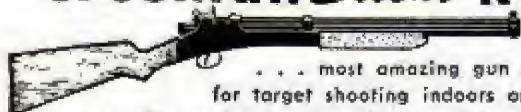
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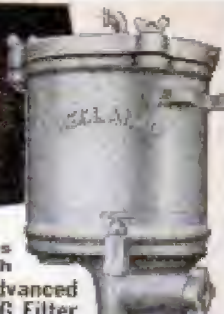


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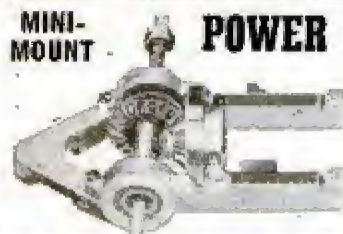
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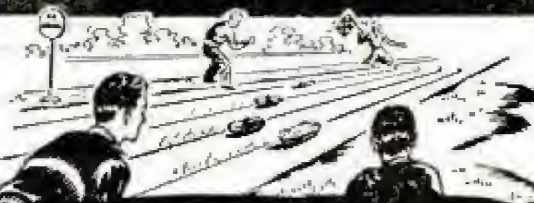
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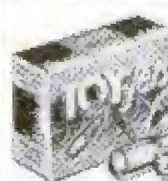
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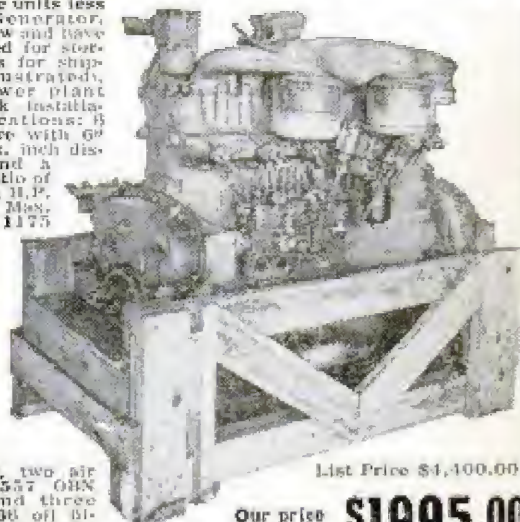
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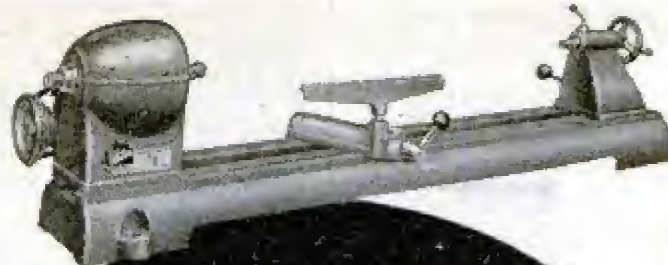
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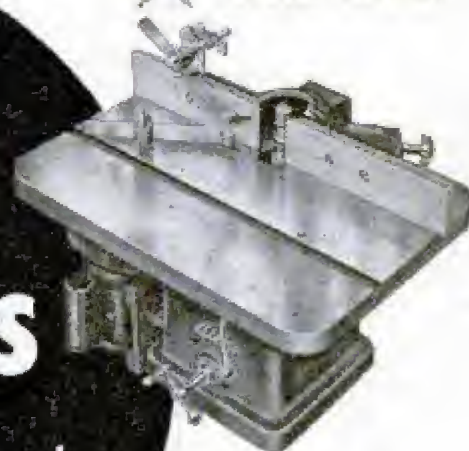


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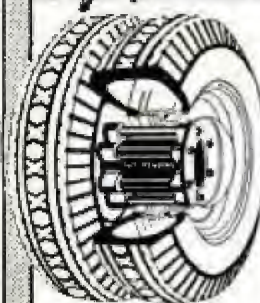
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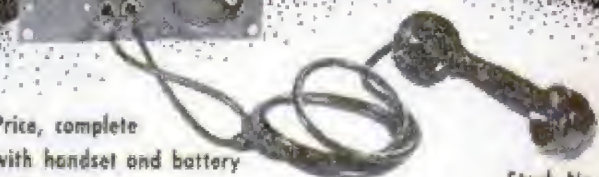
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POPULAR MECHANICS



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## Amazing New P&H AC Arc Welder with Dial-lectric Control



### Makes sound welds easier, faster, and at lower cost

These industrial and commercial arc-welding jobs are easier to do and cost less when you use a P&H Dial-lectric AC Arc Welder:

- All types of industrial welding
- Sub-contracting work for large manufacturers
- Air conditioning
- Home heating
- Truck body building
- Trailer building
- Automotive repairs { blocks, fenders, frames }
- Fuel-oil tanks
- Contractors' welding
- Bridge work
- Construction equipment repairs { excavators, tractors, graders, ditchers, etc. }
- Kitchen equipment
- Cabinet work
- Fabricated housing
- Fabricated garages
- Cast iron repairs for foundries
- Maintenance work for industrial plants
- Ventilating systems
- Bicycle repairs
- Stainless steel bar equipment
- Ornamental iron work
- Fabricating equipment of your own design

Built for heavy industrial use, with welding service range from 20-275 amps. Also ideal for automotive, general repair, job welding, and machine shops; foundries; schools; etc.

#### The only welder with easy-to-use Dial-lectric Control

Anyone can quickly learn to use the new P&H Dial-lectric welder. There is only one control — the dial is clearly marked and a ¼ turn of the radio-like knob covers the entire welding range. There are no plug-ins to make, no wheels or levers to crank or adjust — welding is just plain easy with a P&H Dial-lectric machine. A clearly illustrated, easily understood welding manual is supplied with each machine so that beginners can learn to weld in an extremely short time. Old hands may pick up some new tricks, too.

#### No maintenance is needed

Dial-lectric control eliminates all moving parts. That is why P&H AC Welders require no attention or maintenance — why operating costs are lower — why so many industrial users are switching to this new welder. Also, NEMA rating assures you of long life and dependable operation.

#### You produce sounder, better-looking welds in a shorter time

The P&H remote control feature permits proper heat selection at the job. You waste no time or energy walking back and forth to the machine to make adjustments. There is no temptation to skip — remote control lets you use the right heat. Welds are sound and better looking. Work is done faster. Additional features that make for better, faster welding are: Easy quick-start arc, High-low welding range, Elimination of arc blow.

#### Requires only 2¼ feet of floor space

You can put a Dial-lectric welder most any place — it is connectible for 220 or 440 volts. Despite its weight of 307 lbs., it is remarkably compact. The Dial-lectric is easy to move around, too — it's mounted on wheels, you handle it just like a hand truck.

#### A complete electrode service is provided by convenient P&H Shop Packs

P&H Shop Packs contain eight different packages of electrodes. Detailed instructions are printed on each individual package so that you can use the right electrode for every

job. Guesswork is eliminated. Welds are stronger, better-looking. You can weld anything made of steel, alloy or stainless steel, sheet metal, cast iron. You can put hard, protective, long-life coatings on new parts, or build up worn parts better than new. The cost of all 8 types, individually packaged and labeled for your convenience, is only \$11.75.

It pays to use P&H electrodes. No matter what make of welder you have, order a P&H shop pack today from your nearby P&H distributor.

#### Reduce welding costs in your plant or business

If you are connected with, or are interested in welding, use your influence to bring in a P&H Dial-lectric AC Welder. A comparison of its performance with that of other units quickly shows that a Dial-lectric improves the quality of the welds, speeds the work, and reduces costs.

A P&H Dial-lectric AC arc welder can be purchased for as little as \$209.75. Also get P&H Shop Pack electrodes (\$11.75). You will want to standardize on these weld rods after you have checked their speed, quality, easy manipulation, and great variety of uses. Contact your nearby P&H distributor, or send in coupon below, clipped to your business letterhead.

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CORPORATION  
Manufacturers of  
America's Most Complete Welding Service

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Yes, I'm interested in the new P&H AC Arc Welder with revolutionary Dial-lectric control, and money-saving P&H electrodes. I would like information on the items that I have checked below.

- ☐ P&H AC Welders ☐ Send address of distributor  
☐ P&H "Shop Pack" Electrodes ☐ Send representative  
☐ Send Free Book, "Simplified Welding"

Name.....

Position.....Company.....

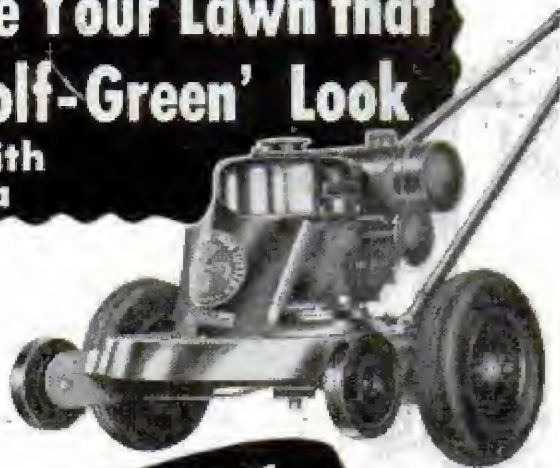
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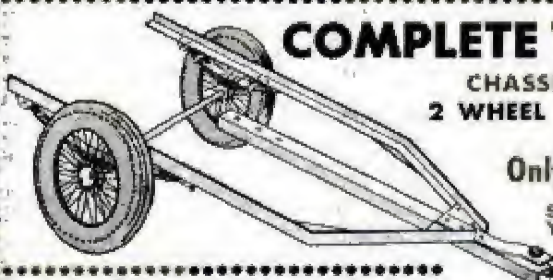
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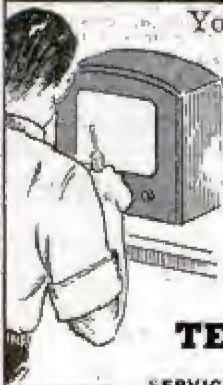
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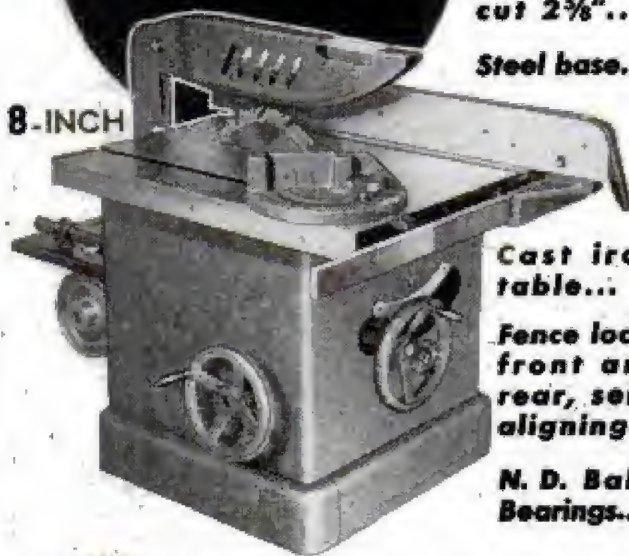
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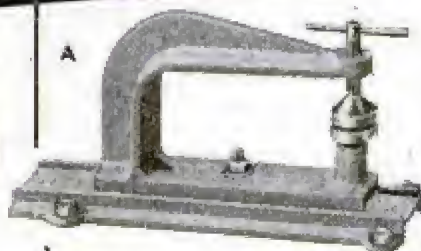
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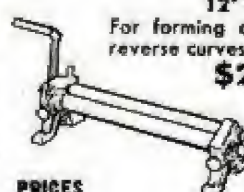
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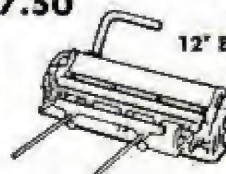
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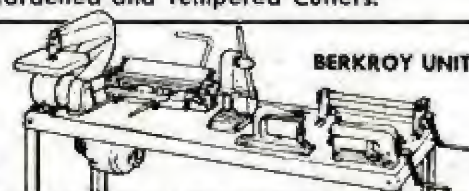


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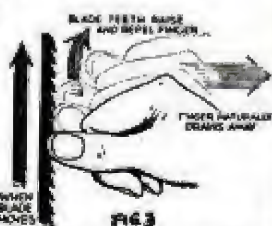


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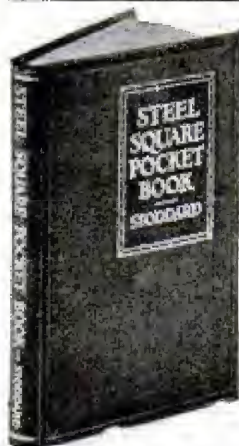
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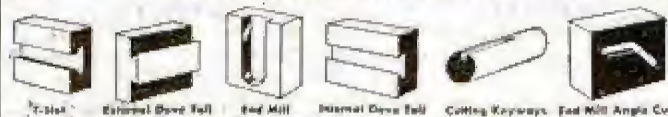
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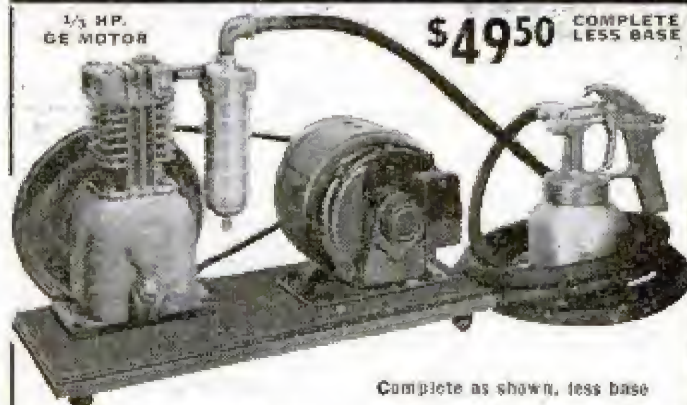
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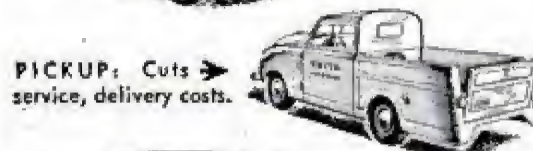
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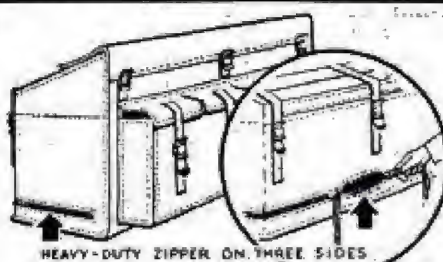
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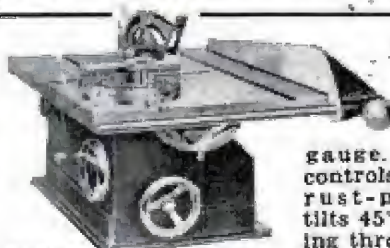
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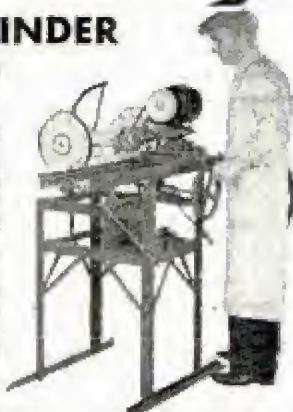
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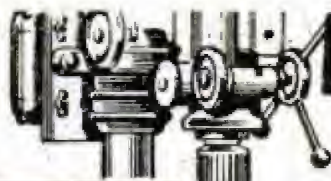


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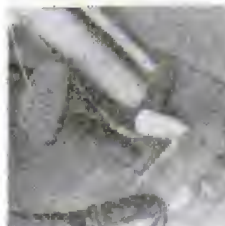
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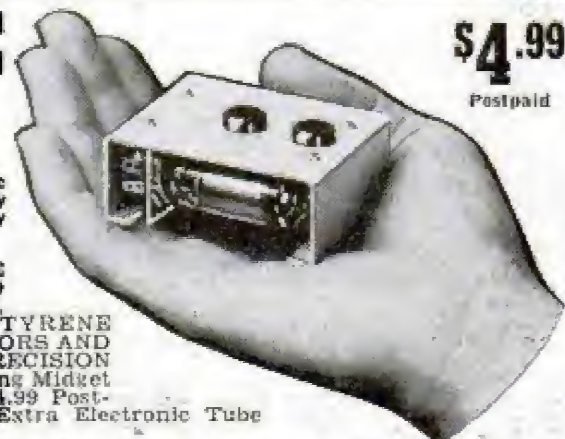
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Brand New! In original packing. Each with four interchangeable lenses, SHOCK PROOF FRAME — SHATTERPROOF LENSES. Use them for all outdoors sports, bench, motoring, boating—anything. Heavy windproof sponge rubber ventilated frame with snap button lens retainers! Adl. elastic head band. Clear, red, green, amber flexible, shatterproof lenses, all instantly interchangeable, with carrying case. They won't last long at this price—it's smart to buy an extra. . . .

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## CLUTCH WITH UNIVERSAL JOINT

Brand new. Formerly used on amphibious Jeeps. Has shaft 3 ft. long and 5 inch pulley . . . with ball bearings in pulley, can be used for power take-off with winch and hoist.

**only \$4.95**

Worth a lot more!

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## BRAND NEW!

Use Them for

SPRAYING MACHINES

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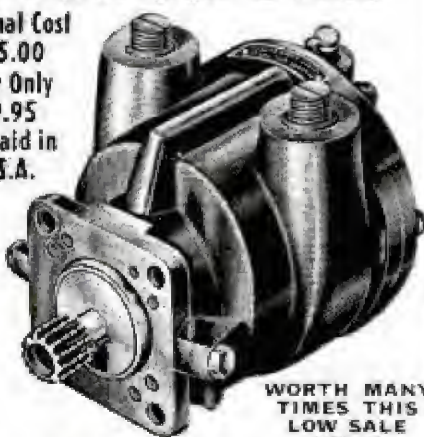
VACUUM PUMPS

HYDRAULIC SYSTEMS

MANURE LOADERS

PRESSES, etc.

Original Cost \$45.00  
Now Only \$9.95  
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WORTH MANY TIMES THIS LOW SALE PRICE

• Originally cost \$45.00. May be used as air or fluid pump—for pressure or vacuum. Standard 3/4 inch pipe thread with interchangeable ports. Will pump 7 1/2 gal. SAE 30 oil per minute at 300 RPM. Builts air pressure of 30 lbs. per sq. in. at 1000 RPM. Vacuum will draw 26 inches of mercury at 1750 RPM. Develops up to 120 lbs. per sq. inch of hydraulic pressure, which in conjunction with a 3 inch hydraulic cylinder will lift 840 lbs. minimum. Runs forward or reverse. Self aligning shaft. Die cast aluminum housing 6 3/4 x 4 inches. Has stainless alloy steel vanes and impeller. Made by Bendix-Avco, Corp. Spline terminal for direct drive—readily replaced with a pulley. Recommend a 1/4 H.P. or stronger electric motor. Rated capacity 1500 RPM with high overload factor. Special price for quantity users. Complete illustrated engineering report and instruction booklet FREE with every pump. Send check or money order today! Postpaid in U.S.A.

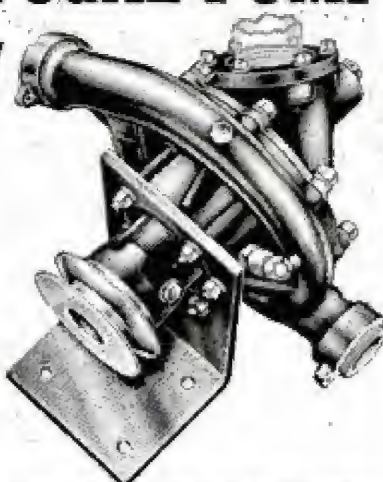
**\$9.95**

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BELT DRIVEN

## BRAND NEW!

READY FOR USE ON ANY LIQUID PUMPING NEED



Use It For DRAINING BASEMENTS

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COMPLETE WITH PULLEY AND MOUNTING BRACKET — READY FOR USE

**\$29.75**

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A super value for all types of intermittent service in pumping large volumes of liquid in home, farm and industrial service. Ideal for home water systems, draining basements, fire protection, etc. On the farm for watering stock, draining ponds, sprinkling, etc. In shops and factories for all types of pumping service.

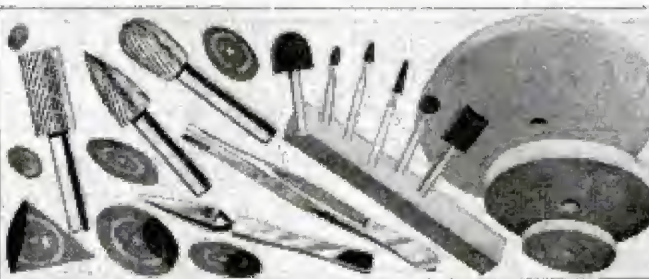
### MOVE LARGE VOLUME QUICKLY

When operated at 1750 RPM, will pump 42 gallons per minute on a 25 foot head; at 3000 RPM on 52 foot head will pump 88 gallons per minute. May be run with electric motor, gas engine or power take-off on tractor.

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Pump has cast aluminum housing—accurately machined bronze impeller vanes. Complete with mounting bracket and 3 1/2" V belt pulley. Shaft rotates on sealed ball bearings with grease gun fittings. Has 1 1/2" threaded intake flange, two 1 inch outlets. Use one or both, as necessary. Made for Packard Motor Car Co. for use in Rolls-Royce Merlin Aircraft engines.

**GREATEST PUMP VALUE IN YEARS**  
Original cost approx. \$147.00. Sold F.O.B. Chicago. Shipping weight 23 lbs. You can't beat this value at anywhere near this price. Satisfaction guaranteed. Original Cost Approx. \$147.00.



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**SATISFACTION GUARANTEED. 350 PIECES \$6.95**  
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Exposure Meter

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ALSO famous Type DW-58 meter . . .  
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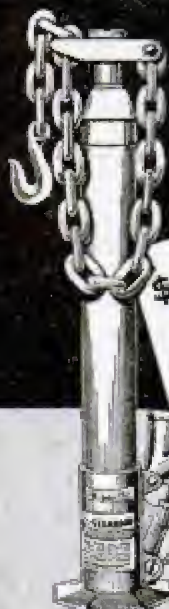


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605-20

### "LOOK IT'S NEW"

Noiseless Fan Blades. More air than ever. Now all air units can be quiet. More efficient. Build a fan, change blades on your own. All sizes—1001 uses. **PATENTED.**  
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**\$15.95**

Complete with chain, hook and handle.

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Here's an all-around hydraulic utility jack with hundreds of uses where easy lifting or pulling is required. Safest, quickest, easiest to use on any car built. Result of 15 years of advanced precision engineering. Extra long, heavy duty steel chain with forged steel grab hook picks up loads from 4" BELOW bottom of jack to 22" ABOVE. Base, handle socket, head and chain plate are all tough malleable iron castings. 17" hydraulic lift, 3000 lb. capacity. Order now at your dealer or send money order or check to

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Ideal for use on all types of mechanical displays wherever small power is required. Made by Cutler. Shaft terminal has helical cut gear; readily and easily replaced by a pulley. New. Operates on door bell or chime transformer. AC-DC 12 or 24 V. Approximately 1/25th H.P. Use one to make your own hand grinder, other power tools. Weighs 13 oz. A value **\$2.98** at only.

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General Utility Pump

For Water and Other Liquids



Drain basements, tanks, pools, etc. Fill stock tanks or use for fire protection and irrigation. Finest internal design. Each stroke of the handle sends forth a powerful spurt of liquid. Pumps 425 gal. per hour at 60 strokes per minute with 3 ft. lift and 6 ft. head. Has 1 inch intake and outlet ports with standard pipe thread. Use hose or pipe. Made by Aero-Corby. Brand new! Fully guaranteed. Wgt. 6 lbs. 11 oz. Quantity is limited. **\$19.95** Hurry! A buy at only.

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Seven assorted toggle switches, all panel mounting types. All different. SP-NT, DP-OT, DP-ST. Brand new. Just the thing for your home made equipment, models, inventions, radio, electronic and other electrical equipment. Complete assortment. Weighs 11 lbs. A buy **\$1.69** at only.

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Please send.....American Bumper Jacks.

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# Paint Your Own Car in *One Hour* with the NEW AUTO ENAMEL

## YOU WIPE ON Like Magic with only a POWDER PUFF

### 2 YEAR Guarantee LUSTR-WIPE

TRADE MARK

Dries in about one hour to smooth, mirror-like professional finish.

**GUARANTEED FOR 2 YEARS** not to crack, chip, peel or fade. If simple directions are followed, Lustr-Wipe is NOT a wax or a polish but a marvelous new Auto Enamel.



**NO Brushing  
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NO Masking  
NO Streaks**

Follow the simple instructions and LUSTR-WIPE will give your car that new FACTORY-LOOK. Dries dust-free in about an hour. Goes over any color, enamel or lacquer.

### ONE QUART PAINTS YOUR ENTIRE CAR ANYONE CAN DO A BEAUTIFUL JOB

LUSTR-WIPE is the easy, speedy, economical, yet most successful way you've ever seen to PAINT YOUR OWN CAR. It's different-works almost like magic! All you need is ONE QUART of LUSTR-WIPE, the Miracle Auto Enamel, and the powder puff we send you AT NO EXTRA COST. Almost ANYONE can do a magnificent job in about ONE SHORT HOUR. It seems unbelievable but true. JUST WIPE IT ON. No brush needed. No spray required. No masking of any kind. LUSTR-WIPE dries dust-free in about an hour. You'll be amazed—thrilled beyond words with the results! Your friends will think you spent \$75 to \$125 for a professional paint job. YOUR CAR WILL LOOK "LIKE NEW". Rush your order for a quart of LUSTR-WIPE TODAY.

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**SAVE by  
Ordering \$3.95  
NOW!**

ORDER ONE OR MORE  
QUARTS TODAY

**3.95**  
PER  
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BLACK	\$3.95 per Qt.
GREY (Gunmetal-Dark or Air Wing-Light)	3.95 per Qt.
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BLUE (Washington-Dark or Monticello-Light)	3.95 per Qt.
SUN BEIGE (Tan)	3.95 per Qt.
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Order one quart or more today! SEND NO MONEY! Mail penny postcard. Then pay postman for LUSTR-WIPE plus postal charges. Or, if you send money with order, WE pay postage. See your dealer or order direct.

Send for free details of powerful money-making plan. Why wait? The weather is ideal for painting cars. START NOW BY ORDERING ONE OR MORE QUARTS OF LUSTR-WIPE TODAY!

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☐ Send Postpaid. Full Payment \$ \_\_\_\_\_ enclosed.  
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☐ Send information regarding AGENT PLAN.

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**AGENTS WANTED FOR NEW MONEY-MAKING BUSINESS!**  
CAN MAKE GROSS PROFITS UP TO \$275.00 IN ONE WEEK.

Go into business for yourself selling LUSTR-WIPE in cans, or painting cars yourself or having others to do the work. Owners of old cars everywhere (who can't get new cars) are easy prospects. Send now for our MONEY-MAKING PLAN.

**DISTRIBUTORS WANTED:** A few wonderful territories now available. Write at once for our SPECIAL OFFER.

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## Announcing SHAPER and MOLDING Cutters FOR ALL MAKES OF DRILL PRESSES!



**NO SET SCREWS TO LOOSEN! BLADES AUTOMATICALLY ADJUSTED. CANNOT SLIP OR FLY OUT!**



### OTHER EXCLUSIVE FEATURES

Blades instantly replaceable—automatically drop into position—cannot loosen or fly out... quickly re-honed or re-ground. Variety of blade shapes for various contours. Balanced, concentric, built for lifetime use. One locking nut only. Fits tapered, threaded, or  $\frac{1}{2}$ " I.D. spindles. Specify type and size spindle.

**\$9.00**

Complete as illustrated with 3 sets of blades. Full Money-Back Guarantee



**\$7.95**  
**ALL-METAL SHAPER FENCE**  
For use with shaper and molding cutters, planers and drum sanders. Fits all drill presses and shapers. Complete—with tempered hold down springs. Fully rust proofed. A real buy.



**2 1/2" DRUM SANDER**  
**\$3.95**  
with 5 Sleeves



**4" ROTARY SANDER**  
Sands wood and plastic surfaces toagate smoothness. Available for hand drills, flexible shafts and drill presses. Two size arbors  $\frac{1}{4}$ " or  $\frac{1}{2}$ ". Complete with 20 discs. **\$5.95**



**ROTARY WOOD PLANER**  
Most sensational, versatile drill press tool ever built. Planes, trues-up, tenons, panels, rabbets, grooves, beads, bevels, etc. An all purpose, lifetime tool. Complete. **\$7.50**

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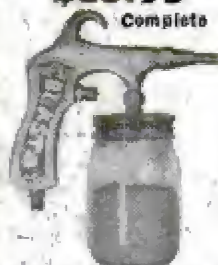
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The most Decorative Gun on market—101 uses. Home Craftsman, Hobbyist or Refinisher—Spray that velvet Suede Finish on your Radio Cabinet, Lamp bases, shades, Book ends, Statuettes, Jewelry boxes, Auto Dashboards. Make things Snagproof, Marproof, Ideal for Cushioning, Art or Sign Work, Print Goods, Sand Blasting Designs on Tools, Wood or Metal. Will remove paint or rust from Auto Bodies. This feature alone is worth \$16.95! Aluminum Alloy Casting, Brass Fittings, Chrome Molybdenum, Heat-Treated Sand, Nozzle and Air-Jet; Shipped complete with stock ready to use, \$16.95. 5-Day money-Back-Guarantee. Money with order Post-Paid in U.S.A. California orders send 2 1/2% Sales Tax.

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Makes your Stop Light Scream. Flashes 115 times a minute. Fully automatic when brake is applied. Approved by leading Safety Engineers. **INSTANT ACTING.** If your dealer can't supply you, send check or \$1.00 for \$3.00. We pay postage. Dealers and Agents desired.

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Makes loose dental plates fit snugly and comfortably.

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For stores, homes, offices. Simple as dialing a phone.

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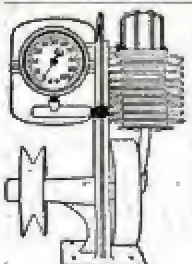
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Portable Air Compressor and storage tank. Ruggedly built of best materials using lifetime lubricated ball-bearing on connecting rod and oil impregnated main bearing on shaft. Unusual design forever eliminates valve trouble, the most common fault in air compressors. **PATENTED** unique air intake system increases efficiency tremendously over other compressors so that air output is much greater than that from larger compressors powered by heavier motors. Will deliver approximately 3500 cu. inches of air per minute at maintained pressure of 90 lbs., or will inflate a 90 lb. truck tire in less than one minute. Comes complete with 100 lb.

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**UP TO 75%  
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IN MANY ITEMS WE HAVE  
THE WORLD'S LARGEST SUPPLY

**NEW HYDRAULIC CYLINDERS, VALVES, PUMPS, FITTINGS, HOSE & TANKS**

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1001 Labor Saving Adaptations for pulling, pushing, lifting operations. Finest precision workmanship and materials. Liquid and or air operation, developing terrific power.

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new equipped with mounting frame, handle, cable, etc. complete. Thousands of Satisfied Users! Hundreds have written, telling us it's the most wonderful tool in the world!

Capacity 2500 lbs. 20:1 ratio

Bronze Worm Gear

Ideal for Garages, Truck loading, Machine Shops, Boat Builders, etc.

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For every purpose at 15% of Value.

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Positive displacement type. Capacity: 1 gal. per min. at 1000 P.M. or 1500 P.S.I. Overhaul speed: 3750 S.P.M. Intermittent maximum 4500 S.P.M. Pressure either drawing with slight adjustments.

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**Here's a Real "Lite Special"**

Farm, Auto, New U.S. Navy Portable Pistol Grip, Sealed Beam, 17w. 24v. Search Spot, or Emergency Light - featherweight Gov. \$25.00 our price

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**Electric GYRO PILOT**

Assembly Part 2 solenoids for reverse and forward motor control, 2 solenoids throw clutch to engage drive. With brake assembly. Can be used as boat rudder control, converted for lathe tapping and slow speed motor tool. Wt. 20 lbs. Finest precision workmanship.

Cost Gov't. \$1000.00

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**PNEUMATIC SQUEEZER**

180 Value \$180

**\$15.95**

**P-4 VICKERS**

Positive displacement pump type.

Capacity: 1 gal. per min. at 2000 S.P.M. or 1500 P.S.I. Operating Speed: 3750 S.P.M. Intermittent maximum 4500 S.P.M. Pressure either drawing with slight adjustments.

**\$14.49**

**AIRFORCE GUNLIGHT**

#102 \$1.95

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**JEEP CANS**

5 gal. gas or oil, self-locking screw cap type 18" x 6 1/2" x 13" Wide

non-leaking

In lots of 5 \$1.09 ea.

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**AIR DRILLS**

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1/4" JCB Chuck

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**New Electric Motors**

#500 new 1/2 H.P. 27 Volt D.C. 24 Volt A.C. This motor can be readily adapted to 110 A.C. by the simple method of re-winding armature brush leads. We furnish free diagram of instructions with each order.

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NEW FULL STRENGTH FOR PORTABLE RADIOS, SIGNAL LAMPS, BOATS, ELECTRIC TRAINS, ETC.

#518 9 Volt 8 1/2 x 6 x 4 in. — 3 run 74 or 27 Volt motor. — 79c

Three batteries are especially suited to portable radios.

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**DC GENERATOR**

140 AMP

Direct Current Generator, specially suited for adaptation to homemade welding unit.

A real moving item at **\$15.95**

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Stainless steel - Shatter proof. Resistant. 10,000 available in 4 different sizes. 1000 cu. in. 2 1/2" x 24 inches - 2100 Cu. in. capacity 29 cu. in. capacity

500 cu. in. capacity \$4.75

1000 cu. in. capacity \$2.49

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3000 cu. in. capacity \$3.95

**1/6 H.P. 24 Volt D.C. Motor, Series Wound.**

New, #501.

**\$3.95 ea.**

**VALUABLE GEARS BARGAINS!**

8 to 1 ratio, spindle drive — #110 \$2.98

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**Radio ANTENNA Reel**

Just the thing for tuning beam antenna

Powered by 1 1/2 H.P. 24 V. D.C. Motor. Removable 4" Reel with Switch - Case Worn parts, Best of gear, balanced clutch.

Motor engaged to gear in direction of rotation when electrical contact made. Operating in either direction. Ideal for auxiliary power source, all opening and closing doors, etc.

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Edco Lux Co.

Don't spec. 2 1/2 lb. extinguisher. Shatterproof heavy case 3 1/2" x 7". Trigger controlled with hose. Fully recharged. 475 Type.

\$30.00 value at \$11.75

3 lb. CO2 type \$22.50 value at \$8.75

10 lb. Ched. CO2 with hose \$60.00 value at \$24.50

15 lb. Ched. CO2 with hose \$80.00 value at \$27.50

**PEXTO SIDE CUTTING PLIERS**

Handled by A. J. Pexto

12" 121

14" 122

16" 123

18" 124

20" 125

22" 126

24" 127

26" 128

28" 129

30" 130

32" 131

34" 132

36" 133

38" 134

40" 135

42" 136

44" 137

46" 138

48" 139

50" 140

52" 141

54" 142

56" 143

58" 144

60" 145

62" 146

64" 147

66" 148

68" 149

70" 150

72" 151

74" 152

76" 153

78" 154

80" 155

82" 156

84" 157

86" 158

88" 159

90" 160

92" 161

94" 162

96" 163

98" 164

100" 165

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115 — 30" — 69c ea.

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Radio tuning shafts that can be used on flex gear driven 115a 12 1/2" x 1/2" nut — 15 tooth splines \$1.95 ea.

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#122 Aero-Seal, Rust Resistant. Slotted with screw gear top. 3/4" to 2".

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**HIGH PRESSURE OXYGEN BOTTLE**

New. Will hold up to 3,000 lbs. PSI, with Co2 used on the in-lator at fire extinguisher, with oxygen for sick room or deep-water diving, etc. Completely equipped with brass valve, 3/8" hose, dial gauge, & canvas bag

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**All Purpose HAMMER**

As a hammer combination for wood & metal work, 2 1/2 lbs. 14" 1/2" hardwood handle, hard steel cutting edge.

**69c**

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Hard steel blades. Expansion wings. Locking device. Right Hand and Left Hand

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**HOBBYISTS!**

An Unequaled Value!

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Rivets, spacers, Clamps, bolts, nuts, Radio parts, gears, etc.

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**PERISCOPE M3 2 Power**

with small 2" telescope inside

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**Tank Telescope**

For Fun & Utility

3 Power

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Converted to 20 power with eye piece. **\$8.95**

**AIRCRAFT CABLE**

Alloyed steel, rust resistant. 3/16" dia. 21 ft. long, with turnbuckle ends. 99c

On reels in any length.

3/32 — 40 Ft. 3/16 — 60 Ft.

1/8 — 40 Ft. 5/32 — 80 Ft.

5/32 — 50 Ft.

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Needle, ball and roller bearings in excellent assortment. Sizes from 1/2" to 2".

#170 Introducing this treasure chest assortment of 15 Bearings at **\$2.95**

**PLASTIC PARALLEL STRAIGHT EDGE**

with knobs & rubber pads for non-slipage on each section. A must for navigators, mechanical draftsmen, Engineers...

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## \$145.00 AND UP

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*You can buy a South Bend 9" Lathe on time payments.*



9" x 3' South Bend Model A Bench Lathe — \$270.00

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**SWINGS**—9 1/4" over bed and saddle wings  
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**BED LENGTHS**—3, 3 1/2, 4 and 4 1/2 feet

**DISTANCE BETWEEN CENTERS**—16 to 34  
inches

**SPINDLE SPEEDS**—  
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Six—41 to 658 r. p. m.

Twelve—41 to 1270 r. p. m.

Sixteen—46 to 1176 r. p. m.

**POWER LONGITUDINAL FEEDS**—

Model A Lathes—48, .0015" to .0853"

Model B Lathes—26, .0021" to .0155"

Model C Lathes—14, .0021" to .0156"

**POWER CROSS FEEDS**—

Model A Lathes—48, .0004" to .0252"

Model B Lathes—23, .001" to .0046"

Model C Lathes—manual operation

**THREAD CUTTING RANGE**—

Model A Lathe—48 pitches,  
4 to 224 per inch

Models B and C Lathes—45 pitches,  
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**MAXIMUM COLLET CAPACITY**—1/2 inch

**QUICK CHANGE GEAR BOX**—Model A  
Lathes

**PLAIN CHANGE GEARS**—Models B and C  
Lathes

The quality that is built into South Bend 9-inch Precision Lathes enables them to produce quality work with efficiency under all conditions. Regardless of the type of machining—between-centers, collet, fixture, or chucking—close tolerances can be maintained and a maximum volume of fine work produced with a minimum of effort. Write for Catalog 9-J which fully describes and illustrates all South Bend 9" Precision Lathes and attachments. Larger sizes with 10", 13", 14 1/2", and 16" swings are also shown.

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Average price increase over prewar level less than 15 per cent.

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are available on Factory Time Payment terms. 25% down pay-  
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### SPEED PRODUCTION WITH THESE ATTACHMENTS

TAPER ATTACHMENT

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COLLET ATTACHMENTS

HANDLEVER BED TURRET

DOUBLE TOOL CROSS SLIDE

CENTER REST

SQUARE TURRET

CARRIAGE STOPS

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ELECTRIC GRINDER

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